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A BRILLIANT PAGE IN AMERICAN VETERINARY HISTORY

The event toward which the veterinary profession has looked for several years—the Twelfth International Veterinary Congress—is now a brilliant page in American veterinary history. Beginning with the impressive opening session on Monday morning and ending with the formal closing session on Saturday, the week was so crowded with activities, of both a business and a social nature, for the ladies as well as the gentlemen, that the program had very much the appearance of a kaleidoscope. One lady described the week as "one continuous round of pleasure," and one foreign delegate expressed the wish that all International Veterinary Congresses could be held in America. These two comments were typical of hundreds heard as the week drew to a close.

Practically every record for a Congress was broken at New York. The total enrollment of ordinary members exceeded the 3,000 mark (the exact number will not be known for several weeks), comparing with 1,546 for the London Congress in 1930. The lady and extraordinary members probably will put the total enrollment close to the 3,800 mark, when the final computation is made. The attendance figure, subject to final revision, was about 1,820. This not only broke all Congress records, but established a new high mark for attendance at conventions of the American

Veterinary Medical Association. The number of lady members enrolled exceeded the 500 mark—another record—and the number of veterinarians' wives and children in attendance—553—set a new figure for future meetings to shoot at. The number included 49 ladies from 16 foreign countries. The alumni dinner meetings, 14 in number, Tuesday evening, brought out an attendance of 547, surpassing the record of 471 established at Chicago one year before, when the alumni of 13 colleges got together. The 1934 figure is still more impressive when it is considered that there were no ladies in attendance at the alumni meetings this year. They were off on an all-day sight-seeing trip.

The climax really came Thursday evening, in the form of the Congress banquet. The beautifully appointed Grand Ballroom of the Waldorf-Astoria presented a sight that will never be forgotten by those present to the number of more than 850. It is reasonably safe to say that this was the largest banquet ever held in connection with a veterinary gathering, at any place or at any time. Even the wonderful facilities of the largest hotel in the world were taxed to take care of the overflow crowd. The accompanying photograph of the banquet scene gives only a faint suggestion of the éclat of the occasion. Add to the picture a delectable menu prepared by Oscar of the Waldorf, beautiful music supplied by Joe Moss and his orchestra, singing by Miss Bessie McCoy, three numbers by Rafaelo Diaz, tenor of the Metropolitan Opera, and then the sparkling addresses of the after-dinner speakers, presided over by that master of ceremonies, Dr. Cassius Way, and one begins to get some idea of the real brilliance of the memorable occasion. Dr. J. R. Mohler extended greetings and introduced Dr. Way. Dr. Robert von Ostertag, of Germany, impressed all with his force and eloquence; Prof. P. Rubay, of Belgium, won everybody to him with his joviality and the warmth of his words; Dr. A. E. Cameron, of Canada, quickly caught the crowd with his droll philosophy; Dr. P. J. du Toit, of South Africa, substituting for Prof. J. Basil Buxton, of England, skillfully mixed scintillating humor with his serious remarks, and Dr. C. P. Fitch, representing the A. V. M. A., brought the addresses to a close with a brief talk that was both scholarly and timely.

Other features of the week, in addition to the program of entertainment arranged especially for the ladies, reported elsewhere, included the reception Monday evening; the testimonial luncheon to Dr. Von Ostertag, Wednesday noon; the official banquet to Government delegates, Wednesday evening; the trip to the Walker-Gordon Farm, at Plainsboro, and the Rockefeller Insti-

OFFICIAL BANQUET TO GOVERNMENT DELEGATES
Twelfth International Veterinary Congress
Waldorf-Astoria Hotel, New York, August 15, 1934

tute, at Princeton, Friday afternoon; the dinner and inspection tour of pasteurizing plants, sponsored by the New York-New Jersey Milk Institute, Friday evening, and the post-Congress clinic, Saturday.

The sessions of the 71st annual meeting of the A. V. M. A., including the first meeting of the A. V. M. A. House of Representatives, were held as per schedule, on Tuesday, Wednesday and Thursday. The Executive Board of the A. V. M. A. was in session all day Sunday, August 12, and held another meeting later in the week, to transact business made necessary by the A. V. M. A. meeting Tuesday evening. Various A. V. M. A. committees met during the week, and it would be safe to say that there was not a minute between 8 a. m. and midnight, any day of the week, when there was not at least one meeting or function in progress, often several of them.

The Permanent Commission of the International Veterinary Congresses met on Monday and again on Saturday, and the Committee on the Award of the Budapest Prize held meetings Friday evening and Saturday morning. The members of the Vermont Veterinary Medical Association got together for a business session on Tuesday and the state and federal regulatory officials present got together for a conference on Wednesday. The Executive Committee of the New England Veterinary Medical Association met during the week to plan the annual convention, to be held in Boston, in October. The American Animal Hospital Association held meetings Friday afternoon and evening.

Too much praise can not be bestowed on the New York veterinarians who worked hard and long to make the meeting one to be remembered. Each and every one who had anything to do with the plans and preparations has reason to be proud.

A STRENUOUS WEEK FOR THE LADIES

New York City for so many years has been the Mecca for American women, that the Twelfth International Veterinary Congress made possible the realization of many a cherished dream. So much has been written and said and sung about New York, its historic interest, its theaters, its skyscrapers, its shops, even its slums, that everyone hopes to visit it, not once, but many times.

Through the skillful planning of Dr. McKim and the members of the Committee on Local Arrangements, several trips to New York were condensed into one busy week. No individual or small party could hope to put into just six days a Wanamaker fashion

CONGRESS BANQUET
Twelfth International Veterinary Congress
Waldorf-Astoria Hotel, New York, August 16, 1934

show, a sight-seeing trip through the residential district, the Bronx Zoo, Playland, a moonlight ride down Long Island Sound, a matinée in Radio City Music Hall, a tour of Radio City and Rockefeller Center, a boat trip around Manhattan Island, with a view of Ellis Island, the Statue of Liberty, the great bridges across the East River, the George Washington Bridge across the Hudson, the Tombs, Blackwell's Island, the Medical Center, the Palisades, the Hudson River docks with ships from all parts of the world, including two world-famous liners at their piers, and from all angles a view of New York's famous skyline, a visit to the lower East Side including Chinatown, the Ghetto, the push-cart section and the fish market, all famous in story and song, and last, but not least, easy access to the famous Fifth Avenue shops and stores, not omitting a certain gift shop on Madison Avenue.

What ordinary individual, we ask, could hope to put all of this into six days? And yet, this is what the New York Local Committee accomplished with a minimum of the confusion and disturbance which usually accompany the handling of a large crowd. All of this was for the ladies alone. In addition we were included in the beautiful reception and the interesting and colorful Congress banquet with the gentlemen.

Our congratulations and our thanks to the Committee on Local Arrangements. The 1934 New York meeting will long be remembered by gentlemen and ladies alike as one of the great events of A. V. M. A. history. A. M. H.

ALUMNI MEETINGS BREAK RECORD

As reported elsewhere, the meetings of the college alumni groups, at the Waldorf-Astoria Tuesday evening, established a new attendance record—547. Alumni of 14 veterinary colleges made up the total. Cornell University accounted for over 25 per cent of the number, with 139 gathered in the Sert Room. Ohio State University alumni to the number of 95, met in the Empire Room. The University of Pennsylvania graduates, numbering 79, crowded the facilities of the Perroquet Suite. Fifty Kansas City Veterinary College men met in Parlor F. Graduates of the Ontario Veterinary College, to the number of 37, celebrated in the Jansen Suite, while 35 sons of New York University celebrated in Parlor M.

The attendance figures at the other meetings follow: Iowa State College, 26; Chicago Veterinary College, 21; Kansas State

College, 20; Colorado Agricultural College, 14; Michigan State College, 13; Alabama Polytechnic Institute, 7; McKillip Veterinary College, 7; Washington State College, 4.

ENJOYING THE SIGHTS AT PLAINSBORO
Dr. and Mrs. J. R. Mohler, of Washington, D. C., managed to get a few hours of comparative relaxation at the Walker-Gordon Farm Friday afternoon.

RADIO ADDRESSES FEATURE CONGRESS

A truly unique feature in connection with the New York Congress was the broadcasting of six addresses, over a nation-wide hook-up of the National Broadcasting Company, during the Farm and Home Hour of the U. S. Department of Agriculture, three on Tuesday, August 14, and three on Thursday, August 16, from 12:50 to 1:20 p. m., E. S. T. Three short-wave stations broadcast the addresses so that they could be heard "round the world." Announcement of the broadcasts had been made in the press in all parts of the United States, in advance of Congress Week, through the efforts of the Committee on Publicity and members of the profession coöperating.

The Tuesday radio addresses were delivered by Dr. D. M. Campbell, of Chicago, Ill.; Prof. Dr. V. Stang, of Berlin, Germany, and Dr. J. Russell Greig, of Gilmerton, Scotland. The addresses on Thursday were made by Prof. Dr. Carlo Bisanti, of Rome, Italy; Prof. Dr. P. Rubay, of Brussels, Belgium, and Prof. Dr. J. Verge, of Alfort, France.

In order to get some idea of how generally these radio addresses were heard by veterinarians, it is requested that those who heard either or both programs, drop a line to the Secretary of the A. V. M. A. If you have heard any comments from any of your clients who may have listened in, pass these along, too.

TRIP TO PLAINSBORO AND PRINCETON

On Friday afternoon, August 17, members of the Congress to the number of over 700 participated in a trip by motor buses and private cars to visit the Rockefeller Institute for Medical Research, at Princeton, and the Walker-Gordon Farms, at Plainsboro, N. J. The latter place was visited first, where the party, in the limited time available, observed the more interesting features of the world's largest dairy farm devoted solely to the production of certified milk. Particular interest was shown in the operation of the "Rotolactor," the slow-motion "merry-go-round" on which the entire milking herd, consisting at present of 1,000 cows, is milked three times daily, all operations from washing the animals to milking them being largely mechanical in nature. The hygienic and sanitary features of the process naturally came in for frequent comment. The visitors were also conducted about the farm to observe the methods of housing, feeding and caring for the cows. The large-scale mechanical dehydration of alfalfa by which some 10,000 tons of green material are dried and preserved annually into 2,500 tons of choice alfalfa hay, without spoilage due to unfavorable weather conditions, also was of considerable interest.

The Congress members then were conducted to the Department of Animal and Plant Pathology of the Rockefeller Institute, about a mile away. Here an opportunity was given to inspect the excellent research facilities provided for studying diseases of animals and of plants. The former activity was started in 1915, with Dr. Theobald Smith as director; the Division of Plant Pathology was added in 1932. Dr. Smith retired as director in 1929 but is still very actively engaged in research work; Dr. Carl TenBroeck is now director of the Institute. The close association of animal and plant pathology studies in one institution is unique but has proven of great value already and promises much for the future.

The visitors had an opportunity to meet the staff members and to inspect the commodious and finely equipped laboratories, also the specially-designed isolation quarters where various diseases

of animals are studied in adjoining units without cross-infection. Many of the Congress delegates, particularly those from abroad, had either visited the Institute prior to the opening of the Congress or planned to do so in small groups before leaving for home. It was obviously impossible, on this trip, for those especially interested, to talk with members of the staff at any length concerning disease studies in progress or problems of mutual interest.

PROBABLY DISCUSSING MASTITIS
Dr. Louis A. Klein, of the University of Pennsylvania (left), and Prof. Halfdan Holth, of the State Veterinary Institute, Oslo, Norway (right).

Light refreshments were served to the delegates at both the Institute and Walker-Gordon Farms. On leaving for New York, the buses were routed *via* Princeton so that the University campus might be seen. The return trip was completed in the early evening. The trip had one drawback, expressed by many visitors —the limited time, which prevented many from observing, in detail, features of the two places to the extent desired.

J. G. H.

COMMUNICATIONS

During the week of the Congress numerous communications were received from prominent officials who were unable to be present for one reason or another. A few of these cables, wires and

letters will serve to show their general nature and the world-wide distribution of the senders.

The following telegram from Acting Secretary of State William Phillips to the General Secretary was in reply to a wire sent President Roosevelt transmitting greetings and expressing appreciation for his patronage:

> The President has directed me to acknowledge the receipt of the greeting sent by members of the Twelfth International Veterinary Congress and to request you to assure your colleagues of his appreciation of their courteous message as well as of his hope that their visit to the United States has afforded interesting and enjoyable experiences.

Secretary of Agriculture Wallace wrote the following letter acknowledging his election to honorary membership:

> I beg to acknowledge receipt of your telegram stating that the members of the Twelfth International Veterinary Congress in session in New York have elected me to honorary membership in the Congress. I am deeply appreciative of this distinguished honor and I trust that you will find occasion to so inform the members of the Congress.

Professor Sir Frederick Hobday, of London, England, a reporter on surgery, sent the following radiogram:

> Kindliest greetings to my colleagues. Deepest regrets that I am unable to be present. Wish Congress greatest possible success.

From Paris, Professor Leclainche, president of the Permanent Commission of the International Veterinary Congresses, sent the following cablegram (translation):

> Regret (my) absence. (Best) wishes (for the) success (of the Congress). Cordial greetings.

Professor Ramon, of the Pasteur Institute, Paris, a reporter on tetanus, also sent a cablegram, as follows (translation):

> With you in thought. Best wishes for the success of the Congress.

Dr. Miloutine Guetz, president of the Veterinary Association of Yugoslavia, sent the following radiogram from Belgrade (translation):

> The Veterinary Association of Yugoslavia expresses its most earnest wishes for the success of the Congress.

From The Hague, Holland, Professor H. C. L. E. Berger, president of the International Bureau of Epizoötics and reporter on meat inspection methods, wrote, in part, as follows:

> * * * * In June I fell seriously ill. I am at present still convalescent and my attending physician has advised me not to make the voyage to New York. * * * * I wish the Congress all success and you the General Secretary in advance my congratulations.

From far-away Shanghai, China, Dr. V. Tsai sent the following cablegram on behalf of his colleagues:

> Please accept hearty greetings and best wishes from members of Veterinary Medical Association of China.

In a letter to Dr. Adolph Eichhorn, Dr. Theobald Smith expressed keen disappointment in being unable to attend the Congress. In part he said:

> Please give my greetings to any mutual friends and present my best wishes towards the ultimate success of the sessions in formulating new points of view in research and new lines of professional activities.

The following extracts are from a letter written by Professor Hutyra, of Budapest, Hungary, to Dr. Eichhorn:

> Now that the Congress is rapidly approaching, I am with you at all times in my thoughts. To the Organizing Committee, which exerted such great efforts, I am expressing my deep regrets that I cannot participate. The condition of my health will prevent me from continuing my activities in matters pertaining to animal health and in all further efforts towards promoting the veterinary service.
>
> * * * * I am obliged to confine myself to sending to members of the Congress, who have gathered on this occasion, my warmest regards, and to offer my sincere wishes for the complete success of the Congress.

Professor Naoshi Nitta, of Tokyo, Japan, wrote a letter expressing his regrets at the inability of his government to send any delegates to the Congress. Many other letters were received along the same lines, but lack of space makes it impossible to reproduce them here.

OLD FRIENDS RENEW ACQUAINTANCE

Sir Arnold Theiler, of Switzerland (left), and Dr. P. J. du Toit, of South Africa, enjoying the scenery at the Walker-Gordon Farm.

POST-CONGRESS CLINIC

The clinic for small animals on the last day of the Congress, Saturday, August 18, was held in the amphitheater of the College of Pharmacy of Columbia University, 113 W. 68th St., New York City. The number of veterinarians in attendance varied from 450 to 500 throughout the day. The seating arrangement enabled everyone to have a good view of the surgical demonstrations. To facilitate seeing these, spotlights were used to spot the operations while they were being performed. Also, microphones were employed to carry the descriptions of the operations made by the demonstrators in their natural tone of voice. Thus, everybody saw and everybody heard.

The clinic started at about 9:30 a. m., and continued until about 4:45 p. m., except for a recess of about 45 minutes for lunch, which was served by waiters to the audience while remaining seated. It was necessary for the Chairman to restrict the number of questions, in order that the program might be completed. The large number of questions asked each demonstrator indicated the interest of the veterinarians in the operations. The program follows:

1. "Epidural Anesthesia in Small Animals," by Dr. E. J. Frick, Department of Surgery and Medicine, Kansas State College, Manhattan, Kan. Dr. Frick showed by his demonstrations that epidural anesthesia is a very practical method of producing posterior anesthesia and explained cases in which it is most applicable.

2. "Enucleation of the Eye, with Particular Reference to Suturing of Lids," by Drs. H. C. Stephenson and H. J. Milks, Small-Animal Clinic, New York State Veterinary College, Cornell University, Ithaca, N. Y. This demonstration was very well performed and explained by Dr. Stephenson. Copies of a typewritten description of the operation were distributed among the audience, in order to facilitate Dr. Stephenson's explanation. This is believed to be an innovation and a distinct step forward as far as clinics are concerned. The plan should be considered in arranging clinics in the future, especially when a large number of persons are likely to be in attendance. The prepared description gives everyone an opportunity to follow every step of the operation.

3. "A Pharmacological Demonstration on the Circulation," by Drs. H. H. Dukes and Jesse Sampson, Department of Veterinary Physiology, New York State Veterinary College, Cornell University, Ithaca, N. Y. Without any question, this demonstration was a treat to the veterinarians in attendance, as they had graphically

shown and explained to them the effects of a large number of drugs on the circulation. Dr. Dukes showed his complete knowledge of this subject by the successful way in which he demonstrated the effects of a large number of drugs on one animal. A great amount of preparation and the setting up of much equipment had been necessary for this demonstration. The scientific way in which it was handled brought much praise to Dr. Dukes and his assistant, Dr. Sampson. It was a distinct contribution to the clinic program.

ENGLAND AND CANADA AT PLAINSBORO
Mr. P. J. L. Kelland, of England, and Dr. E. A. Watson, of Canada, interrupted a discussion of BCG vaccine for this snapshot.

4. "Reduction of Large Inguinal Hernia," by Dr. W. M. Mitchell, Professor of Surgery, Royal (Dick) Veterinary College, Edinburgh, Scotland. Those present appeared to be greatly interested in this demonstration, since they were anxious to see how our colleagues from across the sea performed. That their curiosity was satisfied was indicated by the large number of favorable comments heard on all sides. It is unlikely that any operation in human surgery could have been performed more scientifically, particularly with reference to asepsis and surgical technic. Dr. Mitchell has a great asset in his ability to combine wit with a thorough explanation of an operation, which keeps his audience in good spirits at all times. His demonstration of how this particular operation should be performed gives every practicing veterinarian a goal for which to strive.

5. "Scarff Method of Aseptic End-to-End Anastomosis of the Intestines," by Dr. W. F. Guard, College of Veterinary Medicine, Ohio State University, Columbus, Ohio (assisted by Dr. D. A. Eastman, Moline, Ill.). Dr. Guard's manner in performing and explaining this operation showed his complete ability as a surgeon as well as his knowledge of the subject. While operating, he paid particular attention to performing his operation in such a way that the audience could see each step. Following the operation, he further explained the suturing of the intestines, by a blackboard diagram.

6. "Cesarean Section in Small Animals," by Dr. E. K. Sales, Small-Animal Clinic, Michigan State College, East Lansing, Mich. Dr. Sales showed many points during the course of this operation which should be of great value to the practicing veterinarian.

7. "Simplified Blood Examination," by Dr. R. E. Nichols, College of Veterinary Medicine, Ohio State University, Columbus, Ohio. Dr. Nichols read a paper on this subject which proved to be very interesting to the veterinarians present, as it is a new field and one which is of great importance from a diagnostic standpoint. Unfortunately, the audience was too large for Dr. Nichols to be able to show some lantern-slides in connection with his paper.

8. "Cecetomy," by Dr. D. A. Eastman, Moline, Ill. Dr. Eastman demonstrated and explained this operation from the standpoint of the practitioner. Everyone appeared to be very much interested in the demonstration, as it afforded an opportunity for them to compare the work of a practitioner with that of a college professor. It was quite evident from the comments that were heard that Dr. Eastman's methods as well as his ability were of the first rank.

9. "Latest Method of Setting Fractured Femur with Needles," by Dr. A. R. Anderson, Los Angeles, Calif. Dr. Anderson demonstrated a new method of setting a fracture of the femur by drilling small strong needles into the ends of the bone and then placing a splint over the ends of the needles, thereby holding these in apposition. The method appeared to be very practical.

Arrangements for the clinic were in charge of a committee headed by Dr. C. P. Zepp, Chairman, who was assisted by Drs. L. A. Corwin, J. Stuart Crawford, J. B. Engle, L. W. Goodman, R. J. Garbutt, R. S. MacKellar, Jr., and N. J. Pyle.

WOMEN'S AUXILIARY MEETS

The eighteenth annual meeting of the Women's Auxiliary to the A. V. M. A. was held in the Sert Room of the Waldorf-Astoria, on Tuesday morning, August 14. It was one of the most successful meetings ever held by the organization, if interest and free discussion are indications of success.

Mrs. T. H. Ferguson, of Lake Geneva, Wis., the president of the organization, was unable to attend, but Mrs. Raymond A. Kelser, of Boston, Mass., first vice-president, very graciously presided in her stead.

EAST AND WEST MEET AT PLAINSBORO
This quartet (left to right) consists of Mrs. L. M. Hurt, of California; Mrs. J. H. McNeil, of New Jersey; Mrs. C. H. Stange, of Iowa, and Mrs. G. A. Dick, of Pennsylvania.

A matter of considerable importance was presented to the members by Mrs. G. G. Graham, of Kansas City, Mo., Loan Fund Secretary. She asked that the organization approve the transfer of the clerical work connected with the loan fund to the office of the Secretary of the A. V. M. A. The question was discussed quite in detail and approval was finally given. Members were assured that the action would not change in any way the status or purpose of the Auxiliary or the identity of the loan fund; only the clerical work would be handled by the A. V. M. A.

Reports of the officers indicated that 1933-34, though not a banner year, has been above the average. Several new names have been added to the lists and much enthusiasm has been in evidence.

Mrs. James H. McNeil, of Trenton, N. J., is the newly elected president to serve for a term of two years. She made an earnest appeal to the women for support and coöperation. We sincerely hope that all of the members will give her the approval and the help which she deserves.

BUDAPEST PRIZE TO SIR ARNOLD THEILER

After very mature deliberation, extending over several hours, and considering a number of nominations, the Committee on the Award of the Budapest Prize decided that this token of honor this year should go to Sir Arnold Theiler, in recognition of his contributions to comparative pathology, with particular reference to his work on deficiency diseases in South Africa and more recently his studies on the pathology of bone diseases. Veterinarians of the United States and Canada have followed the work of Sir Arnold with particular interest, since his visit to this country in 1923.

In connection with the award of the Budapest Prize, considerable discussion took place as to the exact meaning of the term "work" in the paragraph of the original text defining the purpose of the prize. Two opinions were expressed relative to the proper interpretation of the word. One group held the opinion that the term "work" meant a book, while the other group held that the word should be taken in its broader sense. The Hungarian Veterinary Association, donor of the prize, will be asked to decide the point before the 1938 award is made. Either way, the award is *pro meritis*. Congratulations, Sir Arnold.

THE HOUSE GETS UNDER WAY

One of the bright spots of the week of August 13 was the auspicious way in which the A. V. M. A. House of Representatives got down to business. Chairman Munce presided over both sessions and kept things moving every minute. Although the total time consumed was only about four hours, at no time was there any semblance of undue haste. Two record votes were required to determine the wishes of the House on two hotly debated questions. Except for the time taken to record these votes, and the few minutes taken to elect a chairman, practically the entire time was consumed with the reading of reports of the officers and committees, and discussing and disposing of them. The report of the Committee on Education, as anticipated, occasioned a very spirited debate, and the House declined to adopt that section relative to the classification of veterinary colleges.

1934 BUDAPEST PRIZE

Awarded Sir Arnold Theiler at the closing session of the Twelfth International Veterinary Congress

Amendments were initiated, which, if adopted a year hence, will result in further improving the present set-up of the A. V. M. A. One of these provides for the election of president one year in advance of his taking office. Another change provides for electing the president by mail ballot, nominations each year to be made by the House of Representatives. Another proposal is to add a Committee on Public Relations, to replace the Special Committee on Agricultural Extension Service. A fourth change suggested is to provide for opening up active membership in the A. V. M. A. to persons not having a veterinary degree but its equivalent (Ph.D., D.Sc., or M.D.), who are actively engaged in veterinary work.

As the detailed proceedings of the first meeting of the House will be published in the October issue of the JOURNAL, further comments will not be made at this time other than to say that everything indicates that the A. V. M. A. has taken another important step. However, the responsibility for making the most out of the House of Representatives lies largely with the state associations. The delegates should be chosen with a view to the function that they will be called upon to perform. Delegates should go from their state associations prepared to act in the best interests of the members they represent. And then the delegates should carry back to their associations a report of the important actions of each meeting, thereby completing the circuit.

NEW HAMPSHIRE AFFILIATES

A rather belated report from the New Hampshire Veterinary Medical Association states that at the meeting held November 3, 1933, the organization voted to affiliate with the A. V. M. A. Dr. F. F. Russell, of Concord, was selected to act as delegate to the House of Representatives.

With New Hampshire in the fold, only five state associations remain on the list of states having failed to act: Arkansas, Mississippi, New Mexico, West Virginia and Wyoming.

MANY ARMY OFFICERS PRESENT

The registration list showed an even score of members of the Army Veterinary Corps in attendance, probably the largest number at a veterinary meeting for a long time. Those present were: Colonel Robert J. Foster; Lieutenant Colonels Harold E. Egan, R. A. Kelser, A. L. Mason and Clell B. Perkins; Majors Chauncey E. Cook, Edward M. Curley, W. H. Dean, Seth C. Dildine, Lloyd

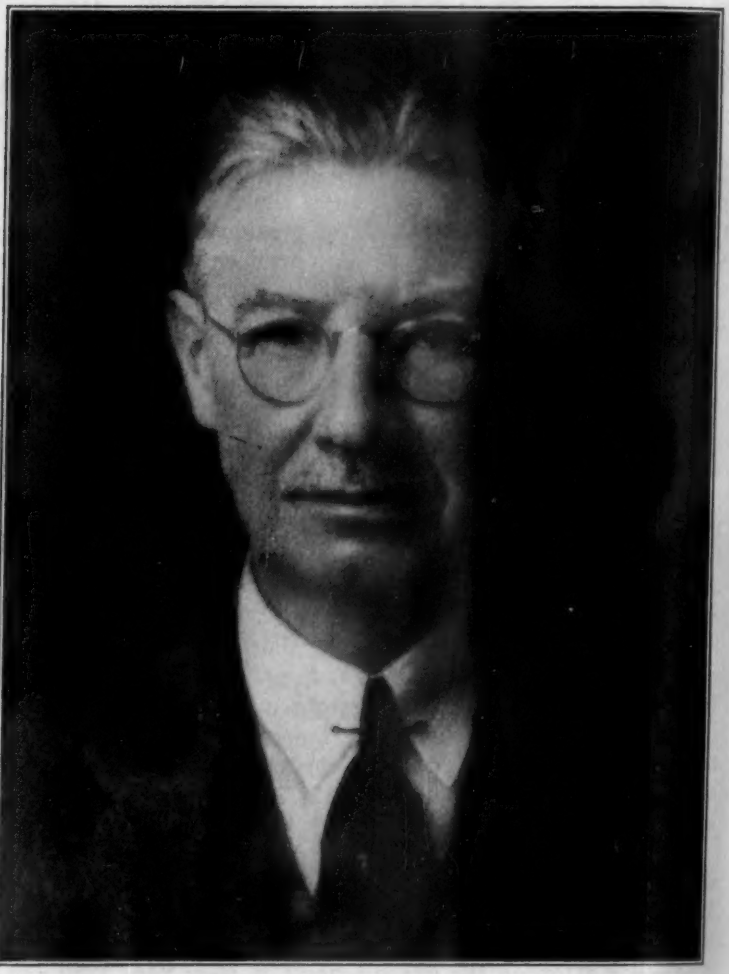
C. Ewen, J. L. Hartman, H. E. Hess, Forest L. Holycross, J. A. McCallam, H. K. Moore, Oscar C. Schwalm, Harry E. Van Tuyl and Louis G. Weisman; Captains L. R. Bower and E. W. Young.

OUR NEW PRESIDENT

For the third time in three years the members of the American Veterinary Medical Association have gone to the Executive Board for their president. "Up through the Board" now seems to be the adopted formula for making A. V. M. A. presidents. During the eighteen years that have marked the present form of organization of the Executive Board, eight times have the members of the Association elected a man to the presidency who had had previous training and experience as a member of the Board. On three other occasions past presidents have been elected to the Board, thus reversing the order.

This year Dr. Robert Stuart MacKellar, of New York, received the highest honor in the power of the American veterinary profession to bestow—the presidency of the A. V. M. A. After an interval of four years, a practitioner again takes the reins. Time was when all members of the A. V. M. A. were engaged in general practice and there was no other place to go to select an A. V. M. A. president. It was in 1897 that this rule was broken for the first time, in the election of Dr. Daniel Elmer Salmon, then chief of the U. S. Bureau of Animal Industry, to the presidency. Dr. Salmon was the first president of the A. V. M. A. who had never been engaged in practice. Since that time there have been numerous occasions when A. V. M. A. presidents have been elected from branches of the profession other than practice—teaching, control work, research—showing the readiness of the profession to divide up the honors and the desire to recognize and reward merit wherever it may show itself. This is as it should be and connotes a condition of sound health in the body politic.

Born in Edinburgh, Scotland, July 12, 1875, Dr. MacKellar, the eldest of six sons, came to the United States as an infant with his parents, Archibald and Jeanie Malcolm MacKellar, who will celebrate their sixtieth wedding anniversary next month. Dr. MacKellar attended the grade schools of New York City and the high schools of Huntington and Nyack, N. Y. At the age of 19 he was graduated from the New York College of Veterinary Surgeons and entered practice in Greenwich Village, New York City. He has continued his practice there except for two years (1900-1901), when he was located at Nyack, N. Y. A son, Dr. Robert S. MacKellar, Jr. (Corn. '28), is associated in the practice.



ROBERT STUART MACKELLAR, D. V. S.
President of the American Veterinary
Medical Association, 1934-1935

Dr. MacKellar has been a regular attendant at A. V. M. A. meetings for many years. He joined the Association in 1910 and was elected member-at-large of the Executive Board in 1927, at the meeting in Philadelphia. In 1930, at the Los Angeles meeting, he was elected Chairman of the Board, to which office he was re-elected in 1931, 1932, 1933 and 1934. The Board had already elected Dr. MacKellar to the chairmanship for another year, prior to the A. V. M. A. election Tuesday evening, August 14.) By virtue of his office as member-at-large of the Executive Board, Dr. MacKellar has served on the Budget and Policy committees for seven years. As Chairman of the Special Committee on Humane Society Hospitals, several years ago, he rendered conspicuous service in ironing out differences between humane societies and private practitioners in several of our large cities.

In addition to his activities in the national organization, Dr. MacKellar has given much time to the interests of his state and local associations. For nine years he was secretary of the Veterinary Medical Association of New York City and then he served that body for three years as president. In 1925, he was elected vice-president of the New York State Veterinary Medical Society and one year later was made president. He is a life member, past master and trustee of Hiram Lodge No. 449, F. & A. M., and a member of Empire Chapter No. 170, R. A. M. He is a member of Phi Zeta, honorary veterinary fraternity, and of the Alumni Association of New York University.

SOMETHING RATHER SERIOUS
The President and the Treasurer of the A. V. M. A. Dr. Robert S. MacKellar, of New York (left), and Dr. M. Jacob, of Tennessee (right).

NEW A. V. M. A. OFFICERS

As a result of the election of officers at the A. V. M. A. meeting, Tuesday evening, August 14, the following will serve for the year 1934-1935:

President: Dr. Robert S. MacKellar, New York, N. Y.
First Vice-President: Dr. George Alexander Dick, Philadelphia, Pa.
Second Vice-President: Dr. Willard F. Guard, Columbus, Ohio.
Third Vice-President: Dr. Hugh E. Curry, Jefferson City, Mo.
Fourth Vice-President: Lieut. Col. A. L. Mason, V. C., U. S. Army.
Fifth Vice-President: Dr. Walter Wisnicky, Madison, Wis.

Dr. M. Jacob, of Knoxville, Tenn., was elected to succeed himself as treasurer for the year beginning January 1, 1935, and Dr. H. Preston Hoskins, of Chicago, Ill., was reappointed secretary for the same period. Dr. Cassius Way, of New York, N. Y., was elected member-at-large of the Executive Board, to fill the unexpired term of Dr. Robert S. MacKellar. At the meeting of the Executive Board, held later in the week, Dr. Way was elected chairman of the Board, a position which he held from 1922 until 1927.

APPLICATIONS FOR MEMBERSHIP

(See July, 1934, JOURNAL)

FIRST LISTING

APPEL, D. R. 511 New Federal Bldg., Atlanta, Ga.
D. V. M., Cincinnati Veterinary College, 1920
Vouchers: A. L. Hirleman and L. A. Mosher.

ARNETT, Ross H. 138 Hedley, Medina, N. Y.
D. V. M., Cornell University, 1917
Vouchers: Don A. Boardman and E. C. Cleveland, Jr.

BRANDS, FRANK J. 388 Saint Johns Place, Brooklyn, N. Y.
D. V. M., McKillip Veterinary College, 1912
Vouchers: L. D. Krohn and A. M. Mills.

CALLDEMEIER, HUSTON A. 409 S. Jackson St., Louisville, Ky.
D. V. M., Cornell University, 1934
Vouchers: E. Calldemeier and F. M. Kearns.

CAULFIELD, CHAS. E. 162 West 56th St., New York, N. Y.
V. S., New York College of Veterinary Surgeons, 1892
Vouchers: J. Elliott Crawford and R. S. MacKellar.

COFFIN, JOHN M. 1312 S. Division St., Peekskill, N. Y.
V. M. D., University of Pennsylvania, 1931
Vouchers: J. G. Wills and F. W. Andrews.

COOLEY, LEON S. Meridian, N. Y.
B. V. Sc., Ontario Veterinary College, 1910
Vouchers: A. J. Tuxill and J. G. Wills.

CROWFORTH, ANDERSON 180 Walnut St., Lockport, N. Y.
V. S., Ontario Veterinary College, 1891
Vouchers: J. G. Wills and Frank E. McClelland.

FEHR, FREDERIC F. 243 S. Elmwood Ave., Buffalo, N. Y.
D. V. M., Cornell University, 1903
Vouchers: Don A. Boardman and E. C. Cleveland, Jr.

HONORING DOCTOR VON OSTERTAG

Testimonial luncheon in honor of Professor Dr. Robert von Ostertag tendered by the Organizing Committee of the Twelfth International Veterinary Congress, Waldorf-Astoria Hotel, New York, August 15, 1934

FREER, GEO. H. 11 Hope St., Liberty, N. Y.
D. V. M., Cornell University, 1923
Vouchers: Arch Freer and J. G. Wills.

GIBBS, CHARLES E. 31 Liberty St., Fredonia, N. Y.
D. V. M., Cornell University, 1904
Vouchers: J. G. Wills and F. W. Andrews.

GOSS, LEONARD J. New York State Veterinary College, Ithaca, N. Y.
D. V. M., Ohio State University, 1934
Vouchers: Leonard W. Goss and W. F. Guard.

GOUBEAUD, CHARLES J. 206-03 43rd Ave., Bayside, Long Island, N. Y.
D. V. M., Cornell University, 1928
Vouchers: D. H. Udall and J. G. Wills.

GRUENEWALD, GEO. J. 49 Menzel Ave., Maplewood, N. J.
D. V. M., McKillip Veterinary College, 1914
Vouchers: A. A. Husman and Arthur W. Smith.

HOLDEN, EDGAR WENDELL N. Y. State Vet. College, Ithaca, N. Y.
B. S. A., Macdonald College, 1923
D. V. M., Cornell University, 1934
Vouchers: J. N. Frost and D. H. Udall.

KENNELLY, EDWARD M. Box 416, White Plains, N. Y.
D. V. M., Cornell University, 1926
Vouchers: C. E. DeCamp and H. B. Leonard.

KISSILEFF, ALFRED Flourtown, Pa.
V. M. D., University of Pennsylvania, 1933
Vouchers: M. D. Stoudt and John D. Beck.

KOENIG, F. F. 236 Fluvanna Ave., Jamestown, N. Y.
D. V. M., Cornell University, 1909
Vouchers: J. G. Wills and F. W. Andrews.

LANGE, CHESTER J. 27 Jones St., New York, N. Y.
D. V. M., Cornell University, 1932
Vouchers: T. A. Newlin and Mark Sternfels.

LEIBY, E. D. 2578 Harrison Ave., Ogden, Utah
D. V. M., Colorado Agricultural College, 1920
Vouchers: Irvin Owens and E. A. Bundy

MCANULTY, CHAS. J. 10 N. Wyoming Ave., Atlantic City, N. J.
V. M. D., University of Pennsylvania, 1913
M. R. C. V. S., Royal College of Veterinary Surgeons, 1919
Vouchers: W. B. Maxson and G. A. Dick.

MCDONALD, ALVIN R. 175 Jefferson St., Passaic, N. J.
D. V. M., Kansas State College, 1934
Vouchers: J. Payne Lowe and Maj. Harry E. Van Tuyl.

MOSEDALE, ROBERT E. Bernardsville, N. J.
M. R. C. V. S., Royal College of Veterinary Surgeons, 1902
Vouchers: W. B. Maxson and W. F. Harrison.

NELSON, HAROLD G. Port Jefferson Sta., Long Island, N. Y.
D V. M., Cornell University, 1924
Vouchers: J. G. Wills and F. W. Andrews.

PERKINS, LT. COL. CLELL B. Fort Jay, N. Y.
D. V. M., Ohio State University, 1912
Vouchers: Oscar V. Brumley and W. F. Guard.

RANNEY, ALBERT F. 17 East Ave., Ithaca, N. Y.
D. V. M., Cornell University, 1932
Vouchers: Herbert L. Gilman and R. R. Birch.

SAVAGE, JAMES F. 200 Baldwin St., Hackettstown, N. J.
D. V. M., Kansas State College, 1925
Vouchers: J. G. Hardenbergh and R. W. Jackson

SCHLOEMER, CHARLES C. 235 33rd St., Woodcliff, North Bergen, N. J.
V. M. D., University of Pennsylvania, 1907
Vouchers: Jos. A. DeGroodt and H. Preston Hoskins.

SELLMAN, W. J. 180 N. Genesee St., Utica, N. Y.
B. V. Sc., Ontario Veterinary College, 1918
D. V. M., Cornell University, 1927
Vouchers: J. G. Wills and F. W. Andrews.

SHELDON, THOS. 64 E. Market St., Rhinebeck, N. Y.
D. V. M., Cornell University, 1907
Vouchers: Wm. Henry Kelly and Geo. A. Knapp.

SUTTON, HARRY W. Unadilla, N. Y.
D. V. M., Cornell University, 1923
Vouchers: J. G. Wills and F. W. Andrews.

TRAYFORD, ARTHUR East Main St., Huntington, Long Island, N. Y.
D. V. M., Cornell University, 1927
Vouchers: E. B. Ackerman and Cassius Way.

WEBSTER, LOUIS C. 181 Gibson St., Canandaigua, N. Y.
D. V. M., Cornell University, 1915
Vouchers: J. G. Wills and F. W. Andrews.

Applications Pending

(See August, 1934, JOURNAL)

SECOND LISTING

Gloss, Ellis H., Gaylord, Minn.
Hagler, Curtis E., c/o John Morrell & Co., Topeka, Kan.
Hall, Frederick A., 106 S. Cowen, Garrett, Ind.
Killian, Gilbert R., 768 E. Big Bend Rd., Webster Groves, Mo.
Parker, G. Thatcher, Box 14, Red Bank, N. J.
Paul, S. G., Clarence, Iowa.
Philipsen, W. H., Brandon, Vt.
Sommer, Henry L., 1210 Steiner St., San Francisco, Calif.
Stover, Henry H., Langhorne, Pa.
Weston, B. M., Asheboro, N. C.

The amount which should accompany an application filed this month is $6.67, which covers membership fee and dues to January 1, 1935, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

American Public Health Association. Pasadena, Calif. Sept. 3-6, 1934. Willimina Rayne Walsh, Secretary, 50 W. Fiftieth St., New York, N. Y.

New York City, Veterinary Medical Association of. Hotel New Yorker, 8th Ave. and 34th St., New York, N. Y. Sept. 5, 1934. Dr. R. S. MacKellar, Jr., Secretary, 329 W. 12th St., New York, N. Y.

Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. September 5, 1934. Dr. Harley B. Wood, Secretary, 2754 Meramec St., Saint Louis, Mo.

Interstate Veterinary Medical Association. Elks Building, Omaha, Nebr. Sept. 10, 1934. Dr. G. L. Taylor, Secretary, Plattsmouth, Nebr.

Chicago Veterinary Medical Association. Palmer House, Chicago, Ill. Sept. 11, 1934. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.

San Diego County Veterinary Medical Association. San Diego, Calif. Sept. 11, 1934. Dr. L. K. Knighton, Secretary, 3438 Mountain View, San Diego, Calif.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. Sept. 12, 1934. Dr. A. S. Schlingman, Secretary, Parke, Davis & Co., Detroit, Mich.

Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. Sept. 18, 1934. Dr. C. C. Foulk, Secretary, 1103 E. 47th St., Kansas City, Mo.

Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. Sept. 19, 1934. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.

American Humane Association. Columbus, Ohio. October 9-11, 1934. Mr. N. J. Walker, General Manager, 80 Howard St., Albany, N. Y.

Maine Veterinary Medical Association. Lewistown, Maine. October 10, 1934. Dr. R. E. Libby, Secretary, Richmond, Maine.

New England Veterinary Medical Association. Boston, Mass. October 22-23, 1934. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.

Purdue University, Veterinary Short Course. Purdue University, LaFayette, Ind. October 23-26, 1934. Dr. R. A. Craig, Department of Veterinary Science, Purdue University, LaFayette, Ind.

Pennsylvania State Veterinary Medical Association. Hotel Casey, Scranton, Pa. October 25-26, 1934. Dr. Thos. D. James, Corresponding Secretary, 816 N. Main Ave., Scranton, Pa.

Florida State Veterinary Medical Association. Joint meeting with Southern States Veterinary Medical Association. Mayflower Hotel, Jacksonville, Fla. October 29-30, 1934. Dr. J. V. Knapp, Secretary, The Capitol, Tallahassee, Fla.

Southern States Veterinary Medical Association. Joint meeting with Florida State Veterinary Medical Association. Mayflower Hotel, Jacksonville, Fla. October 29-30, 1934. Dr. M. R. Blackstock, Secretary, 157 W. Hampton Ave., Spartanburg, S. C.

ADDRESS OF THE PRESIDENT*

By CLIFFORD P. FITCH, *President*
American Veterinary Medical Association
Saint Paul, Minn.

Fellow veterinarians, ladies and gentlemen: This, the seventy-first annual meeting of the American Veterinary Medical Association, is indeed fortunate in having its sessions conducted jointly with the Twelfth International Veterinary Congress. It is the first time that this International Congress has come to America. We have already extended to its members a sincere welcome and we hope and trust that this meeting will be of as much value to the foreign delegates as it will be to the members of our Association. We are sincerely appreciative of the honor conferred upon us by the Permanent Committee of the International Veterinary Congress in the election of one of our members to the vice-presidency of this Committee. We are justly proud of the achievements of Dr. John R. Mohler, not only as the Chief of the Bureau of Animal Industry, but as a scientist and sanitarian, whose work is appreciated not only in his native country but abroad as well. We are very grateful for the opportunity to act as host on this occasion—the twelfth meeting of the International Veterinary Congress.

A "President's address" is a very difficult thing to define. In my opinion it resists definition. This address might be called "An Address on Presidential Addresses." I am going to attempt to show the progress that the veterinary profession has made in this country, based in part upon the addresses of past presidents of this organization. We hope that it will be short.

It has well been stated that "there is nothing new under the sun." True, there are many interpretations of well-known, fundamental facts which may have strikingly new applications. The president of your organization, in the short space of one year, actually wields little influence. He is like a shadow flitting across the bright horizon. He needs to be very careful that he does not too deeply obscure the landscape. This is safeguarded in part by a constitutional provision that precludes his re-election.

The history of this Association is a narrative of progress, nowhere better portrayed than in the addresses of its past presidents. Born in this city in 1863, a brief 71 years ago, it celebrated its fiftieth anniversary in this metropolis in 1913, and

*Presented at the seventy-first annual meeting of the American Veterinary Medical Association, New York City, August 14-16, 1934.

now fittingly returns in conjunction with the Twelfth International Veterinary Congress.

History, unadorned with dynamic personalities, is as dry as the husk of the walnut, and sometimes as bitter. Illuminated by the genius of discoverers, it becomes an intensely interesting and instructive presentation. May I briefly call your attention to four men who have contributed, in my opinion, more to the science of medicine than any other group. I realize the temerity of such a selection. I refer to William Harvey, John Hunter, Louis Pasteur and Joseph Lister. All were clinicians except Pasteur. He gave us the foundation of the germ theory of disease and furnished basic information necessary to explain decomposition, which Lister's great genius applied to antiseptic surgery.

William Harvey, the discoverer of the circulation of the blood, from which significant event modern medicine dates, struck open the door of medical dogma which had dominated science up to that time. He was at war with the social systems and prejudices of his day. His work was not only creative; it was inevitably destructive of much of the almost revered heresies of days long past.

John Hunter, the great Scotchman, born in 1828, laid securely and for the first time the scientific foundations of surgery. Before his day, explanations as to the cause of symptoms and their interpretation were fantastic and unreal. Hunter sought, in changes of the organs of the body after death, structural reasons for their origin and progress. He founded, to a very considerable degree, the science of pathological anatomy. He sought explanations for the manifestations of disease in the examination of structural changes, and linked together such changes and the complex symptoms which they cause.

In Lister's time, "a pin prick was a door open to death." Hospitals were often called "houses of death." Lister, following the lead of the great master Pasteur, concluded that the causal element of putrefaction was not the oxygen of the atmosphere as had been universally believed, but minute organisms contained in the air and capable of infinite propagation in suitable medium but deprived of life by exposure to great heat. If this were true, two events alone were required to prevent infection of wounds: destruction of microörganisms before they gained access to a wound, or their destruction within the wound itself. These two Lister put to trial and his work gave rise to the methods of modern antiseptic and aseptic surgery.

These men were fundamentally biologists. A study of life in its protean forms had quickly become a daily habit with them all. In animals after death, not only did they seek a knowledge of structure by dissection, but they endeavored to correlate structure with functional activity. The work of these men was fundamental. They were properly trained in the basic sciences and applied that training to the art of medicine.

Veterinary Education

Veterinary education was a dominant theme of our presidential addresses for many years. At the time this organization was perfected, not a single graduate of a veterinary institution in this country was available. Schools, however, quickly sprang up and fortunate indeed was the profession in the leadership of these schools.

The demands for higher educational qualifications have been met. Not only do our veterinary colleges require four years of high school training for entrance, but most of them require a collegiate year in the basic sciences in addition. A president of this Association, more than a quarter of a century ago, stated:

> The raising of the requirements for admission to the profession cannot fail to have an elevating and beneficial influence on the profession as a whole. It means that from this time on the legal accessions to our ranks must be men of mental capacity * * * better fitted to deal with such problems as confront us in modern life, and instructed in the whole range of modern comparative medicine, men trained to grapple with multitudinous questions of the most varied veterinary practice, in city or country, at home or abroad, with breeding, selection, development and training, with dietetics and hygiene, with infection and its extinction and exclusion, with trade conditions and inspections in abattoirs and in transit, with transient and permanent immunizations.

It has been decided that veterinary education is a function of the state, that it is one of the most expensive forms of education and cannot be given efficiently on a cost basis. As a result, state-supported or privately endowed veterinary institutions alone are now operating. Another president, more than a decade ago, said:

> There has been a tendency to increase the number of veterinary schools supported by the people. As a matter of state pride, individual commonwealths have seriously considered the establishment of such institutions. It would be unfortunate should the number of veterinary schools increase until there comes from the people a greater demand for this type of education. While there was an excuse for the maintenance of a private veterinary school of mediocre caliber, there can be no reason for the existence of a state veterinary college, a teaching staff, housing and facilities, that are not in keeping with the increasing demand for animal husbandry.

Must Have Leaders

There are two fundamental phases of medical education: the science of medicine and the art of the practice of medicine. It has been said that a good physician is born, not made. This is true only in part. One must have, however, an innate love of our profession before success can be secured. We cannot have the successful practice of the science of medicine without its art. We cannot have the best teaching without great leaders in our colleges and schools. Personality influences personality. The life of each of us has been touched by the lives of others. I am sure we can recall the dominating influences of the leading teachers of the school which we attended. I know this is true in my own case and I must pause for a moment to pay tribute to the great and good man who most influenced my veterinary career, who has now passed to his reward, Dr. Veranus A. Moore. We all have similar memories. Our schools and colleges should not lose sight of the fact that they must develop leaders. In order to do so they must have leaders among their faculties, not only leaders today but leaders tomorrow and tomorrow's tomorrow.

The medical profession has very recently come to realize that the country practitioner was an indispensable influence in the community. His place could not be taken by the specialist. Personality as well as professional attainment is an attribute of successful physicians. Our veterinary schools should not lose sight of the art of veterinary practice in the maze of its scientific ramifications. Science is a necessity. Art is indispensable.

Classification of Colleges

The time has arrived when we should classify our veterinary institutions. We owe this to our prospective students. The medical profession has long since classified its educational institutions. This has been a great help, not only to the students but to the institution itself. Education is passing through a transitional stage. This applies particularly to education in the arts and sciences. I commend to your attention the report presented this spring, at Chicago, by a committee of the North Central Educational Association. The work on this report has been voluminous. The results are far-reaching. It furnishes us with the mechanism necessary to evaluate an educational institution properly. Our own Committee on Education has been working steadily and this year we anticipate a report of far-reaching significance. This Association rightfully takes credit for its efforts to improve

veterinary education in this country. The task is not yet completed.

I do not believe that there is any danger of a shortage of veterinarians. This was predicted not many years ago in a presidential address. Young men today appreciate the opportunities which are offered for service by the veterinary profession. It has been my privilege, in speaking with students about to embark on an educational venture, to outline to them the opportunities offered in veterinary medicine. The danger of an over-crowded profession cannot be denied and some of our educational institutions are already limiting their enrollment. Medical institutions have seen the havoc of over-production of graduates. Let the veterinary colleges profit by the experience of medical education, limiting registration before the profession becomes over-crowded.

It has been my privilege during this year to come in contact with a large number of veterinarians in various fields of work. The practitioner, of course, represents more than two-thirds of those actively engaged in the profession. It has also been my privilege to be associated with other professional groups. I have made this observation at a number of meetings, and although it has not remained unchallenged, I am still more fully convinced of its truth than ever before: I believe that the rank and file of the veterinary profession have been able to meet the changed economic conditions of the past few years with greater success than any other professional group. Of course our profession depends for its prosperity directly upon agriculture. That which affects agriculture reacts directly on the veterinarian. The farmer has been and is very low in our economic scale of returns on investment. It should be expected that this would adversely affect the returns for veterinary service. Despite this very unfortunate condition, the veterinarian has been able to earn a livelihood and maintain his rightful position in society. It has taken a struggle, forebearance and, above all, perseverance. These qualities our profession has exhibited to its very decided advantage, and let us hope that the worst is passed.

Disease Prevention and Control

The accomplishments of the veterinary profession in America cannot be better illustrated than by its efforts to control the infectious diseases of animals. Disease prevention and disease control have been the watchwords of the profession in this country. The results speak for themselves. Fundamental research has furnished the tools necessary to carry out effectively these programs which are necessary and vital to animal health. The discovery

of Theobald Smith and his co-workers, of the insect transmission of Texas fever, furnished the key necessary to unlock the southern part of the United States to the cattle-breeding industry and render cattle in this district safe from the ravages of Texas fever. Today susceptible northern cattle can be brought into all the southern states, and nearly all of the area, previously quarantined because of the presence of this disease, has been released. This alone is an accomplishment worthy of the highest praise.

TUBERCULOSIS

Koch's discovery of tuberculin and its application for the diagnosis of tuberculosis furnished the means for the efficient control of this disease. Some members of our profession were faint-hearted. A perusal of the report made by the Committee on Tuberculosis of this Association, or, as it was then called, the International Commission on Tuberculosis, indicates that the *genius* of the great minds of our profession was fully awake to the possibilities of the efficient control of this disease. Koch himself furnished the stimulus when he declared in 1900 that bovine tuberculosis and human tuberculosis were distinct diseases and not intertransmissible. At that time definite data on this important matter were meager. Research workers initiated experiments, the results of which have left no doubt that bovine tuberculosis is transmissible to man.

Fortunately for the animal industry of this country, the leaders of our profession saw the light clearly, indicating the necessity for the elimination of the tuberculous animal. Opposition was encountered, scientific as well as civil. The International Commission appointed to study methods for the control of bovine tuberculosis proceeded calmly on its way. The foundation was laid and in 1917 the super-structure was started under the architectural eye of our late friend, Dr. John A. Kiernan. Today the results of this work are one of the shining examples of the efficiency and scientific soundness of the veterinary profession of this country.

Fourteen states and the District of Columbia are now modified tuberculosis-free areas. More than 60 per cent of all the counties are free of the disease. We are well on toward the successful fruition of this project. Public health authorities have recognized the scientific truth and success of the work and are now applying the tuberculin test to the human family, securing data which aid materially in the elimination of the great white plague. Bovine tuberculosis in man in this country is becoming a rare disease. Scrofula has disappeared from our hospitals and clinics.

In those countries, however, where bovine tuberculosis has been allowed to progress, recent scientific investigation shows that the bovine germ may cause pulmonary phthisis and accounts for fatal cases of this dread malady.

Hog Cholera

The efforts to control hog cholera and rabies have not met with similar success. There are countries which are not afflicted with the menace of either of these diseases. Among these should be mentioned England, which is free of rabies, and Canada, which is free of hog cholera. There are others. This condition has been brought about through determined efforts and eternal watchfulness. In our judgment, it is impossible to control a disease when the virus of that disease can be and is being distributed in unmitigated form. Hog cholera virus unfortunately falls into the hands of those who are not thoroughly trained in its use and familiar with the dangers of its application. It is said, of course, that hog cholera in the Corn Belt is the universal disease. Some European countries say the same about foot-and-mouth disease, yet we have shown in this country that foot-and-mouth disease can be eradicated.

Immunological instruments represent only a part of an extensive mechanism necessary to wage a successful warfare against the ravages of disease. We believe that the successful control of hog cholera and rabies rests in the hands of our trained veterinary personnel, which is already available. Education of the public mind must precede and accompany successful efforts of disease control. The farmer must be made to understand that cheap and inefficient vaccination against hog cholera by unqualified individuals is loss, not gain. The owners of pet animals, especially dogs, should appreciate the need for restrictive quarantines to protect their pets.

Rabies

The situation in Minnesota, in respect to rabies, indicates what may be accomplished in the face of seeming defeat. In the 17 years which I have been in this Commonwealth, there has been no serious epizoötic of rabies. A few isolated cases have occurred from time to time, but through efficient quarantine provisions and their enforcement, these outbreaks have been locally restricted. This condition exists in spite of the large tourist traffic throughout the State, with its accompanying influx to the dog population. At present Minnesota is and has been free of rabies for *three* years. The successful control of hog cholera and rabies

offers a direct challenge to the veterinary profession in this country, the bulwark of which is the practitioner in the field. Laws and regulations are of little value for disease control unless they are enforced by public opinion. Our profession can do much toward moulding this opinion and enlisting its service.

Bang's Disease

Contagious abortion or Bang's disease is a widespread infection. Its relation to the public health has been proven. Although originally considered restricted to cattle, we now recognize that its germ, or its very close relative, is quite universal in its distribution. Recent studies have shown that although original estimates indicated that from 25 to 75 per cent of all cattle in the United States were infected, it would now seem from recent surveys that less than 10 per cent actually harbor the organism. Two methods of control are offered: one based upon the agglutination test with the segregation or elimination of reactors, and the other the use of living vaccines. Vaccines have been widely used in Europe for the control and alleviation of this infection for many years. A careful evaluation of the results reported leads one to believe that the disease is not being satisfactorily controlled on that continent.

In the United States the federal Bureau of Animal Industry is now directly supervising the preparation of living vaccines used for Bang's disease. This is a decided step in advance. The results of scientific researches show that vaccines may be of value when restricted in their application to non-infected cows or heifers or to calves. The application of this procedure is limited. These are not the classes of animals for which the herd-owner requests treatment and unfortunately they are all too frequently not the classes of animals that are being vaccinated.

The results of the agglutination test for the diagnosis of Bang's disease have been used to segregate or eliminate the infected animal, and as the basis for building up a clean herd. This method has been and is being successful. It is not attended without difficulty. It has met with defeat. The same thing could be said in regard to the tuberculin test. Twenty years ago, some within the sound of my voice believed that it was difficult, if not impossible, to maintain a herd free of tuberculosis. Nothing that is really worth while is easy of attainment. The proper control of Bang's disease on the basis of the agglutination test is not the dream of a laboratory enthusiast. It will as assuredly come about as our present enviable position in tuberculosis control. The public

are demanding beef and dairy products from healthy animals. Their demand must be heeded. The present testing program will continue and expand.

House of Representatives

Progress of this Association may be noted in the changes of our Constitution and By-laws. It has been well said that we rarely meet when we do not amend our Constitution. If the alterations are in the interests of increased efficiency, they are justified. This year we are inaugurating an entirely new method of legislative procedure. The House of Representatives meets officially for the first time during this meeting. This group was chosen by the members of our profession in the respective state veterinary associations which have become affiliated with this, the national group. We bespeak for this innovation a great success. It places this organization in direct touch with men actively engaged in the work of the profession in the various commonwealths. The functioning of this organization will be directly influenced by those whom it seeks to aid. It can no longer be justly said that a few dominant personalities who are regular attendants at meetings dictate the policies of this organization. If this Association does not fulfill the hopes and desires of the men in the field, their delegates elected by their state associations can and should recommend and place in operation the necessary changes to make this organization of greater value. The state veterinary associations should assume this added responsibility with a full knowledge of its importance. Their delegates should be instructed to voice their well considered recommendations for a more efficient American Veterinary Medical Association.

Criticisms are directed toward this organization. It is the opinion of some that this Association could function much more efficiently. I do not doubt this allegation. I know of no organizations which are altogether efficient. I believe, however, that this Association is doing a great work to advance and improve the veterinary profession in America. That its methods can be improved is freely admitted. The officers await your suggestions. They will be given careful consideration. In the final analysis it is up to you. It is your organization and you can make it what you will.

Ladies' Auxiliary

One of the things which has impressed me during the past year, especially when attending meetings of veterinarians in various

portions of the country, is the great asset of the Ladies' Auxiliary to our veterinary organizations. I believe that some of us are apt to forget the Ladies' Auxiliary as an integral part of our Association. Some state associations have well recognized and properly functioning organizations of the ladies. Some do not. In my judgment those who do not recognize the importance of the Ladies' Auxiliary are missing an advantage which cannot be otherwise improved. It has been my observation that the attendance of ladies at veterinary meetings is a decided asset. Some state associations have a regular custom of entertaining the ladies and in my judgment this could well be adopted by all veterinary associations. Our national organization owes much to the activities of its women who have made distinct contributions to the advancement and improvement of the veterinary profession.

It is both fitting and proper that a presidential address should contain recommendations which, in the opinion of the officer, would make for greater efficiency. There are, however, certain definite limitations for innovations, especially in an organization of this class. Finances are usually the limiting factor. It has been my privilege to represent District 5 on the Executive Board of this organization and, as such representative, have sat in at the meetings of this body. I am fully aware that recommendations of past presidents, which would have materially increased the benefits of this organization to the veterinary profession, would have been quickly put into effect providing it had been financially possible. Raising the dues has been proposed and given careful consideration. It has not been felt that this was a suitable time to increase the dues, even though it was fully recognized that only in this way could the necessary financial assistance be secured to perfect a more efficient organization. These are times of frenzied finance, and it has not been the purpose of your officers to disturb any more than absolutely necessary the already turbulent financial waters.

Recommendations

This year your President has but three recommendations, although he is fully cognizant that many more are in order and some possibly more important.

First: I desire to recommend that the Special Committee on Agricultural Extension Service be discontinued and that the By-laws be amended to provide a standing committee which shall be known as the Committee on State and Federal Relationships. The work entrusted to this Special Committee is vitally important

to the veterinary profession of America. It requires careful consideration over long periods of time. The work is increasing in importance, its field is widening and it will require the best brains of the profession to solve some of the difficulties which are arising. I recommend that this Committee be composed of five individuals, appointed by the President for a term of five years, the terms of office of the original appointees to vary from one to five years, so that the term of one member will expire each year. I believe that this will serve to assist in solving the problems which are presented through ill-advised governmental activities, and aid materially in the promotion of advantageous ones.

Second: I desire to recommend that certain changes be inaugurated in our present JOURNAL. I believe that it would be fitting and proper that certain papers presented at our meetings, which are of limited interest or which are unduly lengthy, either be omitted from the JOURNAL or materially reduced. I believe further that a department which would abstract the results of the latest scientific researches in the fields of etiology, pathology and therapeutics, particularly for practitioners of veterinary medicine, would be of value. It is not always easy for a person trained in the research field to evaluate properly some scientific papers published in our JOURNAL and other scientific publications. It is not easily possible for a busy practitioner to pore over page after page of scientific data and glean the essential knowledge of particular value to his needs. There is valuable knowledge in most of these papers which will not only be attractive but which will be of inestimable use to the practitioners who have limited time for reading. Foreign veterinary literature contains much of interest and value to our profession. This too should not only be abstracted but translated into American conditions and American methods. We can do much to improve the usefulness of our JOURNAL if these procedures are instituted. This can be carried out without materially increasing the present JOURNAL expenses. I believe, however, that even if the expense is increased such departures should be inaugurated.

Third: Your President a few years ago recommended that the Constitution of this Association be amended so as to admit to active membership persons having a doctorate degree in medicine, science or philosophy. As far as I know, nothing has been done with this particular recommendation. I desire to call it to your attention again and respectfully urge that measures be taken to permit individuals having degrees commensurate with that of Doctor of Veterinary Medicine, and who have a direct interest in

matters pertaining to this profession, and who, furthermore, have made definite contributions to our knowledge of the science and art of veterinary medicine, to be admitted to membership in this organization. I concur in a recommendation of a former President, who said:

> This membership should be unrestricted and active, rather than a restrictive associate membership. We do not believe there is the least possible danger of the number of these individuals seeking membership in our organization, to be large enough to in any way interfere with the control of this Association which properly remains in the hands of veterinarians.

This year has been an exceedingly active one for me. I have had the opportunity of visiting veterinary associations, veterinary meetings, and veterinarians in many parts of these United States. I have had the privilege of seeing the veterinary profession in action. As your President, I have had the opportunity of addressing veterinary meetings in 20 different states scattered from the Atlantic to the Pacific and from the Gulf to the Pines. It has been a rare privilege. My knowledge of veterinarians and veterinary activities has been enormously increased. I am very deeply appreciative of the honor which you conferred upon me in electing me the President of the largest veterinary organization in the world. During this year I have had the active support of the entire group of officers of the organization. The Executive Board and the Secretary as well as the others have coöperated to make the office of your President pleasurable and proficient. My most sincere thanks to this group of self-sacrificing, ardent and adequate men who are directing the activities of this organization.

The future contains new fields for the veterinarian. His scope of activity will be greatly widened. His field of usefulness will increase. To carry out these increased responsibilities our veterinarian of the future must be a thoroughly educated man.

Annual Science Exhibit of A. A. A. S.

The annual science exhibition of the American Association for the Advancement of Science and associated societies will be held in the new building of the Mellon Institute for Industrial Research, Pittsburgh, Pa., December 27, 1934, to January 4, 1935. From 3,000 to 5,000 scientists from this country and Canada are expected to attend. Already many distinctive arrangements have been made for the exhibition, which may be described as "a common meeting ground where the results in the different fields of science are on a level that all scientists may understand."

WOMEN'S INFLUENCE ON VETERINARY SCIENCE*

By JOHN R. MOHLER, *Washington, D. C.*
President, Twelfth International Veterinary Congress and Chief, U. S. Bureau of Animal Industry

The gratifying attendance of ladies at the International Veterinary Congress suggests the desirability of brief remarks on women's influence on veterinary science. At various times veterinary publications have commented on the subject briefly and the *Veterinary Record*, the official journal of the National Veterinary Medical Association of Great Britain and Ireland, published a ladies' number this year. It dealt with the careers of outstanding women engaged in various branches of the veterinary profession.

In England there is a rapidly growing group of women veterinarians. At the present time few women in the United States have become veterinarians, and these have become veterinarians very recently, so there has been little opportunity for them to establish the record for distinguished service which may be expected in the future. Aside from women veterinarians, a number of women have made important contributions to veterinary science even though they do not have veterinary degrees.

In the field of veterinary parasitology, Dr. Georgina Sweet is known to all Australian veterinarians for her work, and she taught many of them in their veterinary course; Vera Irwin-Smith is another Australian woman who has contributed to our knowledge of parasitology. In England, Dr. Marie Lebour has done much work on the parasites of fish, and Miss Ormerod did important work on ox warbles. The Countess von Linden and Marianna Plehn, in Germany, and Marcel Boppe, in France, have worked in veterinary parasitology. Gertrud Theiler, in South Africa, did excellent work on horse strongyles. Nina Kohl-Yakimov contributed to our knowledge of filarids and protozoa in Russia. C. R. Bakker worked on Ascaris in Holland. Annie Porter is a distinguished Canadian protozoölogist.

In the United States, Dr. Eloise Cram is a well-known scientific figure, having monographed most of the bird nematodes, worked out the life histories of many poultry nematodes which use intermediate hosts in their life cycle, and being at present in charge of the work on poultry parasites in the U. S. Bureau of Animal

*Address delivered at luncheon tendered ladies in attendance at Twelfth International Veterinary Congress, Waldorf-Astoria Hotel, New York City, August 13, 1934.

Industry. Among her associates, Dr. Myrna Jones has worked out the life histories of many poultry tapeworms, Dr. Ena Allen has contributed to our knowledge of poultry coccidiosis, and Eugenia Cuvillier has done excellent work on a nematode worm causing serious losses among pigeons. Dr. Mary Skinker, of the Bureau, has done extensive work on the tapeworms of dogs, cats and wild carnivores. Dr. Olive Swizy, in California, has worked on protozoa, and Adele Hobmaier, of California, has done excellent work on lungworm life histories. Dr. Elizabeth Jones, of Harvard, has made important contributions to our knowledge of coccidiosis and epizoötic tremor of poultry.

In the field of bacteriology, Dr. Alice Evans, of the U. S. Public Health Service, is an authority on the brucelliases. Ida Bengston, also of that service, has made outstanding contributions to our knowledge of botulism. Studying in the same and related fields, Hilda Hempel Heller, of California, has done important work in relation to anaerobic organisms.

Though it is a pleasure and privilege to pay tribute to these outstanding women, my present remarks are addressed more particularly to those engaged in the more customary walks of life. In the home, at the market, in organizations, in schools, and even in sports, women have exerted a surprisingly broad influence on veterinary science and the betterment of the live stock industry. It is the women who largely purchase foods and prepare or direct their preparation in the home. For this reason women have been conspicuous in their sponsorship of meat and milk inspection and in sanitation surrounding the preparation and processing of these animal products. As home-makers they recognize that proper safeguards protect the health and even the lives of their families.

In the eradication of bovine tuberculosis, for instance, the favorable attitude of women, both in cities and rural districts, has been a very material help in the rapid progress of this work in the United States. Judging from numerous incidents reported by the inspectors who have visited farms to make tuberculin tests, the influence of women in behalf of safe milk supplies lends colorful human interest to this great veterinary project.

As wives, mothers and teachers, women likewise have been helpful in promulgating accurate knowledge and correcting distorted information concerning veterinary work. One much-discussed topic is that of animal experimentation. The veterinary profession invites the most searching study of this subject by women individually and by their organizations. We want women to know that the veterinary profession shares with them the de-

sire and effort to alleviate animal suffering. We want them to know the practical measures developed by veterinarians to prevent and cure painful diseases. We invite women's understanding and appreciation of the extensive use of anesthetics by veterinarians. Intelligent and sympathetic women also readily perceive that the sacrifice of a few animals, in research, leads to multiple subsequent benefits to millions of animals in years to come.

Turning to the field of animal production, we find many women who have been highly successful in the breeding and exhibiting of live stock. Women also have been active in the training of horses for racing, polo, and similar sports. Others have engaged in the poultry industry and in raising dogs, cats, birds, and related pet stock. All these vocations and avocations bespeak interest in topics with which veterinarians also deal.

In behalf of the International Veterinary Congress I therefore acknowledge the part that women have played in the development of veterinary science and animal production. And to the ladies who have favored us with their presence on this occasion, I pay a further tribute. Their interest in being here implies a sympathetic appreciation of veterinary work—an interest that so often inspires men to greater attainments. When the women of a household understand the purpose and value of the work in which their men are engaged, there is a congeniality and encouragement which stimulates achievement. Under such favorable home relations, men often develop hidden talents and go far beyond the goal they would have attained under less favorable circumstances.

Thus have women influenced veterinary science in the past. And through the same or similar interests, activities and sympathies, they will continue to have a partnership in the work of our profession.

A Few Attendance Figures

Veterinarians attended the Congress from all states in the Union except four: Arizona, Nevada, New Mexico and South Dakota. Four states had one member each in attendance: Arkansas, Idaho, Utah and Wyoming. Four states had two members present: Mississippi, Montana, North Dakota and Washington. Oregon had three registered. New York easily had the largest attendance, with more than 300 veterinarians present.

Vanity dies hard; in some obstinate cases it outlives the man.
—*Robert Louis Stevenson.*

A STUDY OF THE COMPARATIVE VALUE OF FOWL-POX VIRUS AND PIGEON-POX VIRUS VACCINES FOR IMMUNIZATION AGAINST FOWL-POX*

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The present widespread use of virus vaccination for the control of fowl-pox infection reflects the general acceptance of this method of immunization. This acceptance is based upon the observation that a satisfactory immunity to infection by natural exposure to this disease can be induced by the cutaneous inoculation of an unattenuated fowl-pox virus. Any method of immunization which is dependent upon the use of an unattenuated virus is accompanied by potential hazards, not only from the standpoint of disseminating the disease, but also because of the varying degree of the physical response under certain conditions. In normal birds, this physical reaction incident to vaccination has been shown to be extremely variable. In a previous report[1] the writers presented data showing the degree of the physical reaction accompanying fowl-pox virus vaccination takes at various ages, as reflected in growth gains. The severity of the general reaction which accompanies the successful vaccination "take" may be said to increase during the first year. The most commonly observed manifestation of this disrupted physiological balance in adults is the decrease or total inhibition of egg-production for variable periods. It is obvious that an agent causing such a physical response in normal birds may be a serious factor when applied to birds which are devitalized. Data on controlled experiments and innumerable field observations suggest that the use of fowl-pox virus vaccine be restricted to flocks of birds in good physical condition and applied at an age when the attendant physical reaction will not retard normal growth gains. Granting that fowl-pox virus vaccine is efficient as an immunization agent, one must recognize its limitations and contraindications.

Coincident with the general adoption of fowl-pox virus vaccination in this country, certain European investigators reported the results of experimental studies of pigeon-pox virus for the immunization of chickens against fowl-pox. In 1927, Doyle and Minett[2] reported the observation that chickens were susceptible

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to infection with pigeon-pox virus and that such inoculations produced immunity to fowl-pox infection. These observations were supported by the studies of Zwick, Seifried and Schaaf,[3] who found that fowls vaccinated with pigeon-pox virus showed an absolute immunity against natural infection, and an increased resistance to artificial infection with a fowl-pox virus three weeks following vaccination.

Doyle,[4] in 1930, presented the data of extensive studies of pigeon-pox virus immunization of chickens against fowl-pox infection. The vaccine was a 1 per cent suspension of desiccated pigeon-pox virus in a mixture of 80 parts of glycerin and 20 parts of physiological saline. The immunity, fully established about the 14th day after inoculation, gave complete protection against natural infection and considerable protection against artificial infection with a fowl-pox virus. This author further states:

> The vaccine does not give rise to any constitutional disturbance, loss of condition, or, as far as has been ascertained, interfere with egg production.

These results, which point to pigeon-pox virus as the ideal immunizing agent against fowl-pox infection, will be the subject of some comment in our discussion of the immunity studies to be reported.

Despite the uniformly favorable results obtained by European investigators, pigeon-pox virus vaccines have not come into common usage for fowl-pox immunization in this country. While some authorities have strongly recommended the use of pigeon-pox virus vaccine, field observations and recently reported experiments present contradictory evidence. In two reports (1931[5] and 1932[6]) Johnson concludes that pigeon-pox virus vaccine is a very satisfactory immunizing agent for preventing natural infection of chicken-pox but that this product was not 100 per cent efficient in immunizing against artificial infection. He also observed that this vaccine seemed to have no ill effects upon the birds, nor was there any decrease noted in egg-production following its use.

In 1932, Michael[7] reported the data of closely controlled field trials in which a study was made of the comparative immunizing value of fowl-pox and pigeon-pox virus vaccines. He observed that natural infection with chicken-pox occurred in nine of the 13 flocks in from one to ten months following vaccination with pigeon-pox vaccine. During the same interval, none of the fowls that were vaccinated with chicken-pox vaccine became infected. It is of interest to observe that the conflicting results reported

by Johnson and by Michael were obtained with the Doyle strain of pigeon-pox virus, prepared according to his technic.

Our interest in a study of pigeon-pox virus vaccination was stimulated primarily by the data obtained experimentally by observing the effect of fowl-pox virus vaccination at various ages on normal growth gains. Strictly interpreted, these data indicated that fowl-pox virus vaccination of birds over three months of age was accompanied by a distinct physical reaction in the form of a post-vaccination shock. These results indicated the need of a less depressant virus vaccine for birds as they approached maturity, provided such a vaccine induced an adequate immunity.

The object of this experiment was to study the comparative values of fowl-pox virus and pigeon-pox virus vaccines when administered to fowls at various ages for protective immunization against infection with fowl-pox virus. Groups of birds were vaccinated at various ages with one or the other of the viruses in order to determine and compare the adaptability of each as an immunizing agent for definite age periods, from the standpoint of the induced immunity and the physical reaction which may result from the vaccination "take." That portion of the experimental study, as it relates to the effect of fowl-pox virus vaccination at various ages on normal growth gains, is of added interest, in that it is a repetition of previously reported studies by the writers.

THE VACCINES

The fowl-pox vaccine used in this experiment was an unattenuated virus. The virulence of this strain was such that it uniformly produced well-defined vesicles in four to five days and the formation of scabs in approximately seven days after inoculation of the comb and wattle tissue. The virus material collected on the seventh day after inoculation was desiccated in dry air at 37.5°C. for 48 hours. The stock virus was stored in finely powdered form at 6°C. The potency of this stock virus was tested at regular intervals and was found to retain its original virulence throughout the experiment. The vaccine as used represented a fresh suspension of 8 mg of the stock virus per cubic centimeter of 50 per cent glycerin in distilled water.

The pigeon-pox vaccine was prepared from the Doyle strain of virus. This strain was selected because most investigators who had reported favorable results from pigeon-pox virus vaccination studies had used the Doyle strain. Repeated inoculations of this virus into the feather follicles of the breasts of pigeons

showed that the stock virus maintained a virulence capable of producing a definite swelling four days after inoculation. This vaccination reaction usually reached its height at about the tenth day, at which time the bird was killed and the affected skin tissue removed. Those portions of the affected skin tissue which showed a uniform lesion were cut into squares of four follicles each and suspended in 25 per cent glycerin in distilled water. This stock virus was kept in sealed vials at 6°C. The vaccine, freshly prepared from stock virus, represented a 1 per cent suspension of the finely macerated tissue in 25 per cent glycerin in distilled water and filtered through sterile gauze. Although several lots of desiccated pigeon-pox virus vaccine were prepared, they were rejected because there appeared to be less uniformity in the extent of the local reaction as compared with that obtained by the inoculation of the virus prepared according to the method described.

Procedure

The experiments were conducted on two breeds, namely, Barred Plymouth Rocks and Single-Comb White Leghorns, and represent the progeny of disease-free stock maintained for the purpose of supplying birds for experimentation. Both breeds were used because the marked difference in the rate of growth of each, per given period, would add to the value of the data in determining the degree of physical reaction incident to vaccination "takes" with either virus.

Experiment I

Fowl-Pox Virus and Pigeon-Pox Virus Vaccination of 15 Groups of Barred Plymouth Rocks

The Barred Plymouth Rocks used in this experiment were obtained from a group hatched on April 10, 1932. When 30 days old (May 10, 1932), three groups of two chicks each were selected on the basis of body weight and sex. In selecting these three groups, two for vaccination and one for controls, we endeavored to have the weight totals and sex distribution very nearly equal. One group of two chicks was removed to house 1 of the disease unit, and vaccinated with fowl-pox virus. The second group of two chicks was removed to house 2 of the disease unit, and vaccinated with pigeon-pox virus. The third group of two chicks, comprising the controls, was maintained in similar quarters in the disease-free unit.

Every effort was made to maintain the three groups under the same conditions as to housing, rations, and general care. On

May 17, 1932, when the reserve group of chicks was 37 days old, three additional groups of two birds each were removed for vaccination and control purposes. Similar groups were placed on experiment at weekly intervals until June 7, 1932, when the interval was increased to two weeks and the birds per group increased from two to four. This ration was continued until October 26, 1932, when the 15th lot was put on experiment at the age of 198 days.

The feather-follicle method of vaccination was used throughout this experiment. Previous observations had demonstrated that for the purpose of comparing the local reaction, the inoculation of follicles gave the more uniform results. Observations of the vaccination "takes" were begun on the seventh day after inoculation, and were continued at 7-day intervals until healing was complete. Brief descriptive notations of the local reactions were made in order to denote later any correlation between the extent of the cutaneous reaction and the resultant immunity.

Each bird on experiment, whether vaccinated or control, was weighed at 7-day intervals and the weight recorded in grams. All other factors being equal, observations of growth gains form the most accurate means of comparing the debilitating effect of the systemic reaction incident to vaccination. In this study, therefore, the comparison of the systemic reaction resulting from fowl-pox virus and pigeon-pox virus inoculations are made on the basis of body weight. Although a few of the birds near the end of the series were in production when vaccinated, no production records were kept, as the data would have been too meager to be of any particular value as a supplement to either the observations on body weight or the evidence on this phase resulting from field trials.

As soon as the vaccination "takes" were healed, the fowl-pox virus and pigeon-pox virus vaccinated groups were removed from houses 1 and 2, respectively, and placed in separate quarters permitting limited range. Birds remained in these quarters until the immunity studies were initiated on November 9, 1932.

IMMUNITY TESTS

The study of the degree of immunity resulting from fowl-pox and pigeon-pox virus vaccination was based upon the relative resistance of such vaccinated groups to fowl-pox virus by exposure to infected birds and by means of artificial inoculation. Variations in the length of time between vaccination and exposure also contributed data on the duration of immunity. The same

group sequence employed in vaccination was used also for exposure to infection. For example, all birds vaccinated with fowl-pox virus and those vaccinated with pigeon-pox virus (lot 1) under date of May 10, 1932, were exposed, by contact, to fowl-pox infection on November 9, 1932. Successive groups were exposed at weekly intervals. Each group, never exceeding four birds, was placed in a cage of 3-foot dimensions, containing a bird whose comb showed fowl-pox lesions in the seventh day of development. After seven days of such exposure, the birds were removed and kept under observation for 21 days, to note the development of fowl-pox lesions. Previous trials had shown that the 7-day contact exposure was uniformly successful in infecting susceptible control birds. After the period of 21 days, all birds, including those infected by contact exposure, received an inoculation of fowl-pox virus on the comb. Observations were made on the seventh and 14th days following artificial exposure. The same strain of fowl-pox virus was used for both the contact and artificial infection exposures.

Experiment II

Fowl-Pox Virus and Pigeon-Pox Virus Vaccination of 13 Groups of Single-Comb White Leghorns

The procedure used in this experiment was essentially the same as that described under experiment I, the only difference being in the breed and the number of birds under observation. These White Leghorn chicks were 21 days younger than the Barred Rocks, and consequently were placed on experiment 21 days later (May 31, 1932). Inasmuch as birds of both experiments were subjected to immunity tests on the same dates, there is also a difference of 21 days in the time interval between vaccination and exposure.

Experiment Data

While the primary objective of these experiments was to determine the comparative immunizing value of fowl-pox virus and pigeon-pox virus vaccines against fowl-pox infection, certain other important phases must be considered in our choice of the more efficient product. As set forth in the method of conducting these experiments, the comparative studies are based upon observations of (a) the intensity, extent, and duration of the local reaction resulting from fowl-pox and pigeon-pox virus vaccination "takes," (b) the systemic reaction incident to such "takes" at various ages (this systemic reaction was measured in terms of body weight in grams at 7-day intervals), (c) duration of

immunity, and (d) mortality records, including bacteriological, pathological and parasitological examination results.

As stated previously, all vaccinations were made by means of the feather-follicle method, on the lateral surface of the thigh. Observations on the local reaction were made at 7-day intervals until healing was complete. Such notations show a marked difference in the vaccination "take" as produced by the fowl-pox virus and that of pigeon-pox virus. Fowl-pox virus vaccination resulted in scab formation confined to individual follicles at seven days, accompanied by either a localized or confluent swelling. On the 14th day, the scabs were usually confluent, the swelling was beginning to subside, and healing was progressing. Usually, healing was complete on the 21st day after vaccination. In the younger groups, the local reaction was not so severe or extensive as in the older birds, and healing was well advanced or often complete on the 14th day. *In no instance did a bird of the fowl-pox virus vaccinated groups develop head lesions of pox.* We shall refer to this in a later discussion.

At seven days, pigeon-pox virus inoculation of the feather follicles had usually resulted in a rather extensive swelling, involving the subcutaneous tissues. This swelling seldom showed an acute inflammation. In older birds, the swelling was sometimes edematous, with some serous exudate at the height of the reaction. The swellings usually showed evidence of receding on the 14th day. The reaction subsided more rapidly in the younger birds. In older birds these indurative swellings persisted for a period of a month or six weeks following inoculation. None of the birds vaccinated with pigeon-pox virus developed scabs at the site of inoculation.

The observation of the effect of fowl-pox and pigeon-pox virus vaccination at various ages on normal growth gain contributes data on the vitally important phase of their relative adaptability to certain field requirements. As a result of previous study, the writers recommended early-age vaccination with fowl-pox virus. In the present experiment we wished to procure additional data on this point, as well as to study the comparative results to be obtained from pigeon-pox virus vaccination.

The data pertaining to growth gains of the vaccinated and control groups of Barred Plymouth Rocks and Single-Comb White Leghorns are presented in tables I and II, respectively. The body weight per given date represents the group average. This condensed presentation is justifiable because the mortality in the parallel series of fowl-pox and pigeon-pox vaccinated groups

remained approximately the same. The norm weights represent the average mean of the control birds on experiment per given date. For instance, in table I, the norm weight represents the average of four birds on May 17 and the average of eight birds on May 31, 1932.

The following brief summaries of the data presented in tables I and II are offered for those who do not care to make a detailed analysis.

Table I: Birds vaccinated with fowl-pox virus between the ages of 30 and 86 days, and represented as groups 1 to 7, inclusive, show no interruption of growth gains. In all, except group 3, these gains either exceeded or closely paralleled that of the controls. The continued low average of group 3 resulted from the devitalized condition of one bird which, on autopsy at the conclusion of the experiment, showed a diffuse lymphomatosis. Had this bird been omitted, the weight curve of the group as represented by one bird would have been normal.

The parallel series of pigeon-pox vaccinated groups, 1 to 7 inclusive, also showed uninterrupted growth gains. The average weight gains of these first seven groups indicate that neither virus produces any appreciable systemic reaction when vaccination is done between the ages of 30 and 86 days.

Birds vaccinated with fowl-pox virus at the age of 100 days (group 8) showed a total inhibition of normal growth gains during the fourth week following inoculation, after which the growth curve is uninterrupted. Pigeon-pox vaccination at the same age produced a partial inhibition of normal gains during the fourth and fifth weeks following inoculation, with rapid gains thereafter. Groups 9, 10 and 11, vaccinated with fowl-pox virus at the ages of 114, 128 and 142 days, respectively, showed a gradual increase in the severity of the systemic reaction as reflected in the loss of body weight. In these groups this loss of weight occurred during the second and fourth weeks after vaccination. It is of interest to observe that the parallel series of pigeon-pox vaccinated groups all showed a partial inhibition of normal gains during corresponding periods, but in no instance was there an actual loss of weight.

Fowl-pox virus vaccination of birds between the ages of 156 and 198 days (groups 12 to 15) produced a severe post-vaccination shock with sharp drops in body weight during the fifth week. This was followed by a slow recovery at the conclusion of this phase of the experiment on December 14, 1932. Pigeon-pox virus vaccination of birds of like age showed the first evidence of a systemic reaction sufficient to cause an actual loss of weight.

TABLE I—*Data on experiment I (Barred Plymouth Rocks).*

Date (1922)	Age (Days)	Group 1		Group 2		Group 3		Group 4		Group 5		Group 6		Group 7		Group 8		Group 9		Group 10		Group 11		Group 12		Group 13		Group 14		Group 15		Controls
		F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	F-2	F-3	
May 10	30	805	805																											800
17	37	885	890	255	255																									855
24	44	985	400	345	340	330	330																							382
31	51	490	580	430	445	405	405	485	580																					461
June 7	58	615	650	545	540	455	540	580	585	470	480																			567
14	65	705	705	580	620	500	620	585	625	563	595																			633
21	72	755	855	620	650	550	670	600	720	615	678	732	730																	690
28	79	785	818	730	720	590	735	725	840	640	740	780	823																	810
July 5	86	950	1025	880	895	760	795	950	1030	725	885	858	905	1040	1038															992
12	93	1085	1170	1020	985	850	860	1118	1180	840	1000	935	985	1148	1135															1094
19	100	1800	1840	1100	1040	850	935	1220	1220	905	1077	1080	1050	1215	1230	1097	1088													1192
26	107	1345	1405	1220	1120	880	1045	1330	1340	1010	1227	1200	1120	1365	1350	1157	1208													1338
Aug. 2	114	1465	1496	1260	1245	1040	1190	1525	1510	1090	1360	1242	1180	1460	1442	1197	1255	1385	1308											1456
9	121	1665	1665	1530	1395	1140	1350	1610	1590	1245	1513	1450	1308	1620	1560	1387	1430	1400	1392											1502
16	128	1836	1780	1620	1535	1230	1495	1725	1680	1370	1627	1550	1418	1745	1730	1354	1452	1370	1410	1647	1517									1692
23	135	1910	1805	1760	1565	1280	1560	1830	1730	1415	1653	1640	1440	1865	1775	1487	1475	1480	1487	1670	1600									1787
30	142	2050	1945	1930	1710	1370	1700	1995	1960	1550	1806	1750	1612	1950	1942	1555	1608	1545	1588	1637	1643	1845	1788							1863
Sept.6	149	2080	1995	1960	1765	1400	1685	2065	1910	1565	1837	1883	1810	1970	1972	1660	1630	1537	1638	1700	1763	1892	1852							1893
13	156	2150	2030	2180	1910	1530	1705	2240	1840	1695	1917	1990	1855	2180	2082	1830	1665	1688	1680	1683	1773	1882	1960	1835	1808					2064
20	163	2210	2085	2170	2070	1560	1795	2435	1980	1800	2033	2030	1865	2195	2182	1877	1760	1847	1785	1770	1863	1980	2035	1905	1935					2140
27	170	2330	2150	2360	2080	1650	1795	2350	1970	1905	2043	2100	1830	2345	2207	1943	1767	1887	1810	1880	1910	2038	1948	1885	1985	2030	2018			2197
Oct. 4	177	2475	2230	2490	2125	1790	1825	2545	2030	2055	2127	2250	1840	2475	2300	2077	1870	2007	1842	1993	1940	2125	1930	1930	2010	1988	1998			2280
11	184	2580	2390	2650	2190	1880	1950	2655	2130	2200	2167	2290	1930	2513	2365	2133	1980	2063	1902	2063	2040	2183	2010	2117	2005	2010	2040	2035	2000	2374
18	191	2610	2420	2720	2290	1920	1960	2705	2240	2305	2270	2288	2015	2550	2430	2167	2057	2110	1945	2090	2110	2213	2070	2003	1852	2110	2200	2050	2030	2435
25	198	2700	2515	2790	2380	2000	2115	2730	2300	2256	2393	2340	2015	2590	2482	2173	2170	2153	1990	2097	2143	2130	2150	2027	1880	2195	2313	2072	2025	2230 2080 2522
Nov. 1	205	2765	2480	2940	2410	2090	2210	2825	2270	2380	2387	2445	2060	2663	2560	2220	2210	2180	1980	2150	2180	2175	2200	2070	1882	1988	2093	2160	2072	2283 2135 2660
8	212	2920	2595	3070	2525	2270	2405	2785	2380	2510	2530	2580	2170	2835	2682	2297	2397	2340	2160	2270	2320	2340	2330	2186	2000	2148	2140	2288	2158	2258 2265 2663
15	219					2440	2565	2965	2410	2565	2660	2630	2365	2830	2755	2300	2513	2417	2202	2345	2400	2370	2430	2280	2055	2262	2113	2102	2242	2285 2397 2726
22	226									2610	2613	2863	2340	2920	2822	2446	2627	2557	2352	2493	2540	2475	2570	2450	2145	2382	2348	2140	2262	2315 2380 2794
29	233											2845	2400	2886	2750	2467	2693	2670	2372	2500	2803	2575	2605	2557	2122	2226	2440	2205	2218	2360 2287 2860
Dec. 6	240													2983	2730	2463	2727	2750	2380	2460	2610	2675	2504	2530	2102	2205	2430	2268	2285	2443 2358 2926
13	247															2455	2757	2750	2412	2493	2700	2695	2500	2530	2190	2212	2520	2342	2375	2533 2398 2970

TABLE II—*Data on experiment II (Single-Comb White Leghorns).*

Date (1932)	Age (Days)	Groups																												Con-trols
		1		2		3		4		5		6		7		8		9		10		11		12		13			
		F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p	F-p	P-p		
May 31	30	160	162																											165
June 7	37	238	255	222	220																									245
14	44	330	360	330	325	352	350																							340
21	51	360	390	360	380	402	400																							380
28	58	460	400	460	490	470	515	507	500																					450
July 5	65	530	460	560	590	540	620	570	630																					550
12	72	660	590	680	680	580	750	637	697	640	648																			625
19	79	760	610	740	750	707	800	737	810	650	650																			665
26	86	920	800	910	850	857	950	877	945	708	742	745	740																	760
Aug. 2	93	1000	890	1030	960	957	1030	1033	1000	772	810	775	750																	840
9	100	1110	990	1110	960	1063	1130	1103	1137	880	860	802	845	980	985															1000
16	107	1890	1210	1160	1090	1187	1205	1230	1263	985	985	915	970	1065	1132															1080
23	114	1410	1270	1240	1130	1250	1300	1270	1330	1085	1000	920	887	1080	1152	1000	995													1140
30	121	1390	1290	1310	1220	1287	1350	1303	1387	1115	1048	972	995	1175	1222	1045	1010													1190
Sept.6	128	1470	1460	1430	1230	1393	1380	1463	1420	1240	1092	1058	1018	1168	1190	1028	1035	1018	1015											1250
13	135	1580	1460	1410	1190	1443	1435	1493	1483	1247	1090	1080	1040	1202	1225	1108	1168	1060	1060											1270
20	142	1610	1520	1490	1280	1507	1468	1610	1513	1330	1168	1180	1080	1265	1265	1140	1085	1090	1135	1152	1130									1310
27	149	1770	1620	1610	1330	1600	1522	1710	1603	1485	1162	1270	1152	1370	1380	1272	1065	1162	1195	1205	1165									1400
Oct. 4	156	1830	1640	1670	1460	1693	1565	1750	1717	1502	1195	1358	1185	1450	1532	1292	1095	1185	1220	1225	1220	1335	1335							1480
11	163	1910	1870	1730	1560	1780	1706	1837	1827	1500	1348	1425	1300	1530	1440	1355	1220	1208	1155	1268	1200	1305	1305							1510
18	170	1920	1960	1820	1660	1790	1780	1943	1913	1645	1345	1525	1272	1608	1480	1405	1232	1275	1165	1380	1319	1385	1415	1210	1490					1580
25	177	2090	2000	1890	1680	1860	1876	1873	1953	1665	1435	1652	1412	1638	1570	1475	1310	1330	1295	1420	1380	1410	1460	1530	1535					1630
Nov. 1	184	2030	2040	1910	1690	1887	1903	2007	1980	1707	1348	1660	1370	1740	1582	1600	1338	1438	1335	1458	1422	1405	1485	1445	1568	1442	1452			1675
8	191			1890	1810	1930	1956	2117	2080	1742	1508	1640	1540	1790	1662	1638	1465	1460	1462	1505	1570	1525	1640	1518	1575	1523	1573	1745		
15	198					1950	2010	2130	2080	1835	1495	1662	1517	1790	1650	1670	1490	1530	1495	1530	1505	1595	1710	1515	1595	1563	1464	1760		
22	205							2070	2050	1835	1545	1710	1565	1788	1708	1690	1512	1562	1505	1580	1512	1695	1725	1575	1632	1547	1463	1780		
29	212									1792	1567	1645	1632	1670	1743	1655	1575	1655	1642	1682	1505	1700	1710	1720	1715	1610	1527	1800		
Dec. 6	219											1618	1658	1830	1853	1763	1613	1525	1572	1750	1530	1700	1668	1735	1715	1672	1527	1860		
13	226													1885	1860	1738	1605	1610	1600	1762	1580	1640	1720	1720	1730	1647	1580	1835		

As in the fowl-pox virus vaccinated groups (12 to 15), this loss of weight occurred during the fifth week but the birds recovered more rapidly.

Table II: The Single-Comb White Leghorns vaccinated with fowl-pox virus between the ages of 30 and 72 days and represented by groups 1 to 6, inclusive, showed uninterrupted growth gains. Group 7, representing birds vaccinated when 86 days old, showed a slight weight loss during the fourth week following inoculation. This systemic reaction was transient, however, in that the weight gains rapidly returned to normal.

Groups 1 to 7 of the pigeon-pox vaccinated White Leghorns showed approximately the same weight curves as those of the fowl-pox series.

Group 8, vaccinated with fowl-pox virus at the age of 100 days, showed a weight loss during the second week, and a lesser inhibition of gains the fourth week after inoculation. The behavior of group 8 of the pigeon-pox series was most erratic, in that these birds showed a sharp loss of body weight during the fourth week, with little evidence of a return to normal until three weeks later. It is debatable whether or not we are justified in attributing this to vaccination shock, in that groups 9 to 13, inclusive, of the same series failed to show any such disturbance.

Birds vaccinated with fowl-pox virus at the age of 114 to 128 days (groups 9 and 10) showed a transient inhibition of weight gains during the third and fourth weeks following inoculation, but no loss of weight, as observed in similar groups of Barred Rocks. Groups 11, 12 and 13, vaccinated at the ages of 142, 156 and 170 days, respectively, all show evidence of post-vaccination shock, with subnormal gains during the remainder of the experiment.

As previously stated, the study of the comparative immunizing value of the fowl-pox and pigeon-pox virus vaccines is based upon the presence of detectable lesions of fowl-pox resulting from contact exposure and direct inoculation at variable periods after vaccination. In our opinion, an adequate immunity must protect against infection manifested by definite lesions, on contact exposure. To evaluate the data on the basis of mortality, or the extent of lesions as compared with that of similarly exposed controls, is inconclusive and leads to confusion in a practical interpretation of results.

Groups of birds vaccinated with fowl-pox virus and pigeon-pox virus on the same date were later exposed to infection at the same

time. In referring to table III, the birds recorded as susceptible to infection by artificial exposure (inoculation) to fowl-pox virus are those which were not infected from contact exposure. It is assumed that all birds susceptible to infection by contact exposure would have shown lesions upon direct inoculation. The efficiency of the method of contact exposure of birds in this experiment is reflected by the observation that twelve of the 14 susceptible birds were infected by this method. The data of table III may be summarized as follows:

Birds vaccinated with fowl-pox virus between the ages of 30 and 86 days (groups 1 to 7, inclusive) showed 100 per cent immunity when exposed to fowl-pox infection, 154 to 182 days after vaccination. Birds vaccinated with pigeon-pox virus during the same age period, namely, 30 to 86 days, showed 47 per cent immunity when exposed the same period after vaccination. The comparative values are drawn at this point (group 7) because it was here that the reaction incident to fowl-pox virus vaccination began to affect normal growth gains. It so happens also that the first break in the immunity of birds vaccinated with fowl-pox virus occurred in group 8, when bird 97 developed small diphtheritic lesions on contact exposure. In this, as in each of the 13 other susceptible birds, the lesions were not severe, and healed rapidly, with no mortality. Birds vaccinated with fowl-pox virus between the ages of 100 and 198 days (groups 8 to 15, inclusive) showed 93.3 per cent immunity when exposed to fowl-pox infection, 98 to 147 days after vaccination. Birds vaccinated with pigeon-pox virus during the same age period showed 87.1 per cent immunity when exposed the same period after vaccination. All birds (groups 1 to 15, inclusive) vaccinated with fowl-pox virus showed 95.4 per cent immunity to contact and artificial exposures to fowl-pox infection. Birds vaccinated with pigeon-pox virus showed 77.0 per cent immunity to infection by contact exposure and 72.9 per cent to artificial exposure.

The data of table IV present the results of experiment II, comprising parallel observations on Single-Comb White Leghorns. The tests were conducted in the same manner as those of experiment I. It will be noted that the periods of time between vaccination and exposure are slightly less than in experiment I. This difference is occasioned by the fact that immunity tests in both experiments were initiated on the same date, although due to a difference in age the White Leghorns were placed on experiment later than those of experiment I. The data presented in table IV may be summarized as follows:

TABLE III—*Results of exposure to fowl-pox virus—Experiment I.*

Lot	Vaccination to Exposure (Days)	Fowls Vaccinated with Fowl-Pox Virus					Fowls Vaccinated with Pigeon-Pox Virus				
		Tested	Contact Exposure		Artificial Exposure		Tested	Contact Exposure		Artificial Exposure	
			Infected	Lesions	Infected	Lesions		Infected	Lesions	Infected	Lesions
1	182	2					2	1	Pox	1	Pox
2	175	2					2				
3	175	2					2	1	Extensive pox		
4	168	2					1	1	Pox and diphtheritic		
5	168	2					3	1	Diphtheritic	1	Pox
6	161	4					3	1	Extensive pox		
7	154	4					4	1	Few pox vesicles		
8	147	3	1	Minor diphtheritic			3				
9	140	3					4				
10	133	4					4				
11	126	4					4	2	Pox and diphtheritic		
12	119	4					4				
13	112	4					4				
14	105	4					4	1	Diphtheritic		
15	98	4	1	Few diphtheritic			4	1	Extensive diphtheritic		
Totals		48	2		0		48	10		2	

Birds vaccinated with fowl-pox virus between the ages of 30 and 86 days (groups 1 to 7, inclusive) showed 100 per cent immunity when exposed to fowl-pox infection, 126 to 161 days after vaccination. Birds vaccinated with pigeon-pox virus during the same age period showed 50 per cent immunity when exposed the same period after vaccination. Birds vaccinated with fowl-pox virus between the ages of 100 and 170 days (groups 8 to 13, inclusive) showed 94.4 per cent immunity when exposed to infection 84 to 119 days later. Similar groups of birds vaccinated with pigeon-pox virus showed 61.1 per cent immunity during the same periods of exposure. Summarizing all groups of experiment II, those vaccinated with fowl-pox virus showed 100 per cent immunity to infection by contact exposure and 97.5 per cent by artificial exposure. Those vaccinated with pigeon-pox virus showed 77.5 per cent immunity to infection by contact exposure and 55.0 per cent by artificial exposure.

Although the results of both experiments, as expressed in the percentage of birds involved, are very similar, the lesions in susceptible birds of experiment II were more severe and extensive, with death in two birds resulting from diphtheritic occlusion of the larynx. These birds (groups 5 and 10), vaccinated with pigeon-pox virus, were the only instances throughout the experiment in which death could be attributed to pox-virus infection. In no instance did a bird develop head lesions following vaccination, nor was the systemic reaction incident thereto sufficient to be considered a primary factor in mortality. In view of these observations, we have not deemed it necessary to include a detailed record of mortality. The autopsy records of a certain few birds were carefully considered in evaluating the data pertaining to weight gains.

Discussion

Prior to outlining these experiments, the writers had reported the results of observations on the effect of fowl-pox virus vaccination at various ages on normal growth gains. Although the immunity induced by the cutaneous inoculation of a fowl-pox virus was adequate to protect against infection by natural exposure, it was also apparent that in older birds this cutaneous "take" was accompanied by a systemic reaction severe enough to produce evidence of shock. Such observations which led to the recommendation of early-age vaccination also emphasized the hazards which may result from fowl-pox virus vaccination during the later part of the growing period. Under field conditions the most common manifestations of this systemic reaction are in-

hibition of egg-production or even an appreciable increase in mortality in groups of previously devitalized birds. These unfavorable sequelae have necessitated restricting the application of fowl-pox virus vaccine to certain limitations as to age and vitality of birds. Being an unattenuated virus, its use is further restricted to premises showing previous evidence of infection. It is not surprising, therefore, that pigeon-pox virus vaccines, reputed to possess adequate immunizing properties without such undesirable sequelae or limitations, should command the attention of the poultry industry.

According to certain investigators, pigeon-pox virus vaccine fulfilled the requirements of the "ideal" immunizing agent by conferring a reasonable degree of protection, being free from danger, and by not introducing infection into the flock.

Although we have endeavored to present certain data which would serve as the basis for a comparative study of the systemic reaction incident to fowl-pox virus and pigeon-pox virus vaccination at various ages, such observations are of secondary importance. Regardless of the relative severity of the systemic reaction, the ultimate choice of a vaccine must be based upon its immunizing efficiency. An efficient immunizing agent should protect against infection by natural exposure to the disease. In these studies, our concept of an adequate immunity differs from that of Doyle,[4] who evaluated the degree of immunity on the severity and extent of lesions as compared with those of non-vaccinated controls.

A survey of the summarized data of immunity tests (tables III and IV) indicates the superiority of fowl-pox virus vaccine for immunization against fowl-pox infection. The immunizing efficiency of fowl-pox virus vaccine was 95.4 per cent in experiment I, and 100 per cent in experiment II, as compared to 77 per cent and 77.5 per cent resulting from the use of pigeon-pox virus. A comparison of the duration of immunity is indicated by the results obtained by the immunity tests of the various groups. In experiment I, groups vaccinated with pigeon-pox virus vaccine showed 87.1 per cent immunity as compared with 93.3 per cent immunity resulting from fowl-pox virus, when such tests were conducted during periods ranging from 98 to 147 days after vaccination. There is a marked decrease in the duration of immunity resulting from pigeon-pox virus vaccination when the immunity tests were conducted 154 to 182 days thereafter. These results, substantiated by those of experiment II would indicate that pigeon-pox virus vaccine is not a satisfactory substitute for

TABLE IV—*Results of exposure to fowl-pox virus—Experiment II.*

Lot	Vaccination to Exposure (Days)	Fowls Vaccinated with Fowl-Pox Virus					Fowls Vaccinated with Pigeon-Pox Virus				
			Contact Exposure		Artificial Exposure			Contact Exposure		Artificial Exposure	
		Tested	Infected	Lesions	Infected	Lesions	Tested	Infected	Lesions	Infected	Lesions
1	161	2					2	1	Pox		
2	154	2					1			1	Pox
3	154	3					4	1	Pox	3	Pox
4	147	3					3				
5	140	4					4	1*	Extensive pox and diphtheritic	1	Extensive pox and diphtheritic
6	133	4					4	2	Pox and diphtheritic	1	Pox
7	126	4					4				
8	119	3					4				
9	112	4					4	1	Pox		
10	105	4			1	Few pox vesicles	4	2†	Diphtheritic		
11	98	2					2			2	Extensive pox
12	91	2					2				
13	84	3					2	1	Extensive pox	1	Extensive pox
Totals		40	0				40	9		9	

*Died. Diphtheritic occlusion of larynx.
†One died. Diphtheritic occlusion of larynx.

fowl-pox virus for immunizing chickens against fowl-pox infection.

Regardless of any favorable consideration on the basis of a less pronounced systemic reaction subsequent to its inoculation, pigeon-pox virus has very definite limitations. The relatively short duration of the immunity resulting from pigeon-pox virus vaccination precludes its use for early-age inoculation, where it is necessary to insure an adequate immunity for a prolonged period. It would appear that pigeon-pox vaccine may be substituted for fowl-pox virus when short-interval protection against known exposure is desired, and where the advantages of a less pronounced systemic reaction outweigh the potential hazards of inadequate protection against infection by natural exposure. The need of short-interval protection, with a minimum of disturbed functional activity, is exemplified in the control of fowl-pox infection in egg-laying contests, where, according to reports, pigeon-pox vaccine has proven satisfactory.

Those who recommend pigeon-pox virus vaccination as a substitute for fowl-pox virus do so in part on the basis that such an inoculation results in a lesser systemic reaction. If the immunity resulting from the inoculation of both viruses could be viewed as adequate, the comparative study of the systemic reactions, as reflected in the weight gains following vaccination at various ages, would assume primary importance. A review of the data pertaining to weight gains supports the observations that pigeon-pox virus produces less evidence of a systemic reaction than does fowl-pox virus. Such a reaction, although perceptible by a partial inhibition or temporary loss of weight gains, seldom manifests itself in the form of definite post-vaccination shock. It is of interest to note that the systemic reaction resulting from the inoculation of either virus begins to manifest itself at about the same age and approximately the same time interval following vaccination.

Observations of the effect of foul-pox virus vaccination at various ages on normal growth gains are virtually a repetition of the results presented in a previous report. These results, supported by numerous favorable reports of field trials, clearly indicate the soundness of recommending fowl-pox virus vaccination of birds between the ages of one and three months. It should be noted that our recommendation of early-age vaccination does not apply to chicks younger than 30 days. We have no experiment data in support of day-old chick vaccination.

CONCLUSIONS

1. Pigeon-pox virus vaccination does not produce an immunity sufficiently adequate to warrant its exclusive use in the control of fowl-pox infection.

2. Pigeon-pox virus may be substituted for fowl-pox virus as a vaccine when a short-interval protection is desired and where the advantages of a less pronounced systemic reaction outweigh the potential hazards of inadequate protection against fowl-pox infection.

3. Although its immunizing efficiency is unquestioned, fowl-pox virus vaccination has definite limitations. Birds should be vaccinated when the systemic reaction incident thereto is less apt to be followed by undesirable sequelae.

4. On fowl-pox-infected premises, vaccination of birds between the ages of 30 and 90 days with fowl-pox virus vaccine is recommended.

ACKNOWLEDGMENT

Acknowledgment is made to Dr. P. H. Seitz, who assisted in some of the observations pertaining to immunity studies.

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The dates for the Be Kind to Animals Week for 1935 have been set for April 8-13. Humane Sunday will be celebrated on April 7.

The most wonderful thing about a dog is not his intelligence, but his capacity for loving. The more you love your dog, the more he will love you.—*John Burroughs.*

Nothing is ever done well until it is done easily.—NEWTON D. BAKER.

THE CULTIVATION AND EGG-TRANSMISSION OF THE AVIAN TUBERCLE BACILLUS*

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Observations made by federal and state field workers engaged in the animal tuberculosis eradication campaign suggest that avian tuberculosis may be transmitted through eggs of infected hens. Published reports of experimental work dealing with this subject disagree as to the possible danger from egg-transmission. Gaertner[1] found virulent tubercle bacilli in two out of nine eggs from artificially infected canaries. Artault[2] produced tuberculosis in rabbits with two out of 25 eggs. He believed that the eggs were "undoubtedly infected in the oviduct." Koch and Rabinowitsch[3] suggested that avian tuberculosis might be transmitted through eggs. Mohler and Washburn[4] proved two eggs to contain virulent tubercle bacilli by injecting egg material into guinea pigs. Higgins[5] succeeded in demonstrating tubercle bacilli in three out of six eggs by microscopic examination. Gallagher[6] states that "eggs of diseased birds frequently contain the microbes." Van Es and Schalk[7] make the following statement:

> It seems thus that the transmission by means of the egg must be given consideration, although the data are not sufficiently numerous to enable us to correctly estimate the extent of danger.

Fitch, Lubbehusen and Dikmans,[8] after examining 876 eggs from tuberculous hens, say:

> It would be safe to conclude from these results that less than one per cent of eggs from tuberculous fowls actually contain living tubercle bacteria.

Later, Fitch and Lubbehusen[9] conclude:

> We must view the danger of transmission of tuberculosis through naturally infected eggs of little practical consequence.

Raebiger[10] fed virulent tubercle bacilli to chickens and found tubercle bacilli in 100 per cent of the eggs, ten to 14 days after feeding. Later, the percentage of infected eggs fell to 36.5. Bacilli were found in egg white 60 days and yolk 59 days after exposure to infection. Live bacilli were isolated from egg white after boiling for three minutes and egg yolk after boiling for five

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minutes. Boiling for six minutes killed all tubercle bacilli in the eggs. Thorp and Graham[11] found that eggs artificially infected with *Mycobacterium tuberculosis* (avian) showed a lower hatchability and a higher embryo mortality than uninoculated eggs. Rabbits fed dead chick embryos from eggs inoculated with avian tubercle bacilli developed lesions of tuberculosis, while direct cultures from dead embryos proved positive. They showed also that, on an average, from 1.56 to 3.91 per cent of pullets and 6.46 to 18.28 per cent of mature fowls in state-accredited hatcheries gave positive tuberculin tests.

An analysis of these reports suggests that the difference in results and conclusions may lie in the fact that some workers used naturally infected birds in which the disease might have been inactive or localized at the time of collection of eggs, while others working with artificially infected birds might have had at their disposal birds with active, perhaps generalized, tuberculosis from which infected eggs could more readily be obtained. This thought, together with the field observations mentioned above, furnished the incentive to the work which we are now presenting.

I. Examination of Eggs and Diseased Birds Following Artificial Infection

Methods and Results of Study

Twenty healthy, egg-producing hens were selected, leg-banded and trap-nested; to these were added two cocks. On January 11, the 20 hens were divided into three groups. Seven hens were inoculated intravenously, seven intramuscularly, the injection being made into the muscles at the right side of the breast; and the remaining six were given inoculations *per os*. Those receiving the inoculations by the oral route were given doses of varying sizes, ranging from 2.0 to 5.0 cc. Some of these hens were inoculated as often as five times, at two-day intervals. In giving the inoculations *per os*, care was taken to pass the catheter down the esophagus to the gizzard to avoid a primary lung infection. However, in spite of this precaution, one bird in this series developed a large caseous lesion in the right lung.

The material used for intravenous and intramuscular infections was a preparation made by crushing, in sterile saline solution, tubercles taken from a heavily impregnated liver of a naturally infected hen. The material to be administered *per os* was prepared by emulsifying in sterile saline the liver of a bird showing marked miliary tuberculosis.

On January 19, eight days after injection, the entire group was given a tuberculin test. At this time all birds gave a negative reaction at 24 and 36 hours, thus giving satisfactory evidence that no previous infection existed. Four weeks after the injection of the tuberculous material, the flock was again given the tuberculin test. The results of this test are shown in table I.

TABLE I—*Results of tuberculin test four weeks after artificial infection.*

MODE OF INFECTION	BIRDS TESTED	POSITIVE REACTORS	
		No.	%
Intravenous	7	0	0
Intramuscular	6	4	66.66
Oral	6	1	16.66

At the end of the sixth week, with the exception of two birds, from the group injected intravenously, the entire flock reacted positively to the tuberculin test. These two birds never gave positive reactions to the test, although on autopsy one of the birds was found to have lesions in the liver and spleen, stained smears of which showed tubercle bacilli.

Three weeks after injection, the eggs of the hens were saved for examination. At first the eggs were incubated at 37°C. for three days to allow the *M. tuberculosis* to multiply. Later this practice was discontinued because there seemed to be some evidence to show that other organisms present in the eggs might have reproduced faster than the tubercle bacillus.

The technic employed in examining the eggs is adopted, with slight modifications, from that used by Beller and Henninger.[12] The egg first was cleaned thoroughly and the shell disinfected by immersing it in colloidal iodine (Chandler) for three minutes. The egg then was placed on end in a small beaker and opened aseptically with sterile forceps. The white and yolk then were blown into a sterile Erlenmeyer flask containing a small amount of 1 per cent sodium carbonate solution. This was to serve the dual purpose of homogenizing the egg material and of reducing the number of Gram-negative organisms that might be present. After thoroughly homogenizing the yolk and albumin, the volume was made up to 100 cc with sterile redistilled water. The material then was shaken thoroughly and transferred into a 100-cc centrifuge-tube and centrifuged for one hour and 15 minutes at high speed. The supernatant liquid then was poured off. Two smears were made from the sediment of each egg; the residue

then was resuspended in 6 per cent hydrochloric acid. This solution of acid was weak enough to allow the *M. tuberculosis* to remain uninjured but strong enough to destroy other organisms present. The resuspension was then cultured on slants of Petroff's and of Dorset's egg medium. The tubes were aseptically plugged, covered with tin-foil, and placed in an incubator at 37°C. The smears made from the residue were stained with the Ziehl-Neelson's stain, using 1 per cent hydrochloric acid in 95 per cent alcohol as a decolorizing agent and Loeffler's methylene blue as a counter-stain.

All eggs examined until the beginning of the fifth week after injection were negative. The fifth week after infection, the smears made from the eggs were noticed to contain a few acid-fast granules. These granules were about 0.8 micron in size, possessing a coccoid shape. They were not regular enough in form to be considered spores. It happened that at this time bird 7758 died. On autopsy no lesions were found. There was, however, a slightly rough, depressed area on the ventral side of the liver. Smears made from this area showed no typical organisms but showed many of these acid-fast granules. In the light of the work of Much,[13] Petroff,[14] Petroff and Steenken,[15] Winn and Petroff[16] and Kahn,[17] dealing with granular, dissociated and filtrable forms of tubercle bacilli, it was thought that these granules might be dissociated forms of tubercle bacilli. With this in mind, scrapings of this area were suspended in sterile saline solution and 2.00 cc of this material was injected into the peritoneal cavity of a pullet obtained from tuberculosis-free stock. After six weeks, the bird was autopsied and lesions were found in the liver and mesentery, from which typical tubercle bacilli were observed in stained smears. It is possible that the lesions may have been caused by the regular rod-shaped bacilli which might have been present in the liver. However, if this were true, the bacilli must have been very few, as stained smears failed to reveal them on repeated examination.

TABLE II—*Results of inoculations with egg material in which acid-fast granules were found.*

BIRDS *	EGG MATERIAL INJECTED (DATE)	WEEKS BETWEEN INOCULATION AND AUTOPSY	LESIONS AT AUTOPSY		
			PULLET	RABBIT	GUINEA PIG
4590	March 2	7	None	None	None
7173	March 10	8	Small†	Small†	None
4670	March 10	8	None	None	None

*From which the eggs to be tested were taken.
†Smears of lesions contained acid-fast bacilli.

Egg material containing these acid-fast granules was injected into the peritoneal cavity of a pullet, guinea pig, and rabbit, each one receiving 3.0 cc of a heavy suspension. The results of the inoculation are shown in table II.

While the results of these inoculations were positive in only 33.33 per cent of the tests, they nevertheless offer proof of the presence of *M. tuberculosis* in the egg, either in the rod-shaped form or as granules. It is interesting to note, at this point, that only seven of the 20 hens, two from the group infected intravenously, four from the group infected intramuscularly, and one from the group infected *per os*, laid eggs in which the acid-test granules could be found. In each of these cases, the acid-test granules were observed in more than one egg, while the eggs of the other birds did not contain them. Four eggs from tuberculosis-free hens were artificially inoculated with *M. tuberculosis* to serve in checking the technic. It is of particular interest to note that none of these artificially injected eggs showed the presence of these acid-fast granules.

As previously mentioned, two egg-medium slants were streaked with the sediment obtained by centrifuging, the sediment being suspended in 6 per cent hydrochloric acid. These cultures then were incubated at 37°C. All tubes showing any growth during the first five days after inoculation were considered as being contaminated and consequently discarded. Approximately 16 per cent of the cultures became contaminated with molds, after a period of three to five weeks.

After the cultures had been in the incubator ten weeks, they were examined microscopically. Two smears were made from each tube, whether they had a characteristic growth or not. If the growth on the slant was characteristic of *M. tuberculosis*, and the smears showed nothing but acid-fast organisms, it was considered as proof of the presence of tubercle bacilli. If the growth on the stained smears of the culture were in any way doubtful, the growth was suspended in sterile saline solution and 2.0 cc of this suspension injected into a pullet which had never been exposed to tuberculosis and which reacted negatively to the tuberculin test. Bird 4670 was injected intramuscularly and the others intravenously. Four such injections were made, the results of which are shown in table III.

Over the course of three months, 93 eggs were examined. Pure cultures were grown from 13 of these 93 eggs. Thus it is seen that 13.96 per cent of the eggs laid by these tuberculous hens actually contained living tubercle bacilli. These eggs were laid by

TABLE III—*Results of injecting atypical organisms to determine pathogenicity.*

INJECTED (DATE)	BIRD*	REACTION TO TUBERCULIN TEST		AUTOPSY
		4TH WEEK	6TH WEEK	
April 12	5645	−	+++	June 2—Miliary tuberculosis of liver and spleen; many acid-fast organisms seen in stained smear from lesions July 1—A guinea pig injected with the culture showed no lesions on autopsy
April 16	7052	No test	+++	July 1—Miliary tuberculosis of liver and spleen
June 14	4670	−	++	July 14—Large localized lesion at point of injection. Small pin-head sized foci in liver. Acid-fast organisms were observed in stained smears of above lesions
June 14	N8	−	+	July 17—Many small tubercles in liver and spleen. Acid-fast organisms observed in smears of tubercles of both organs

*From which the eggs tested were taken.

six hens, or 30 per cent of the flock. Many of the remaining 70 per cent went out of production or died from various causes too early in the investigation to be of value.

Of the four eggs used as checks, the bacilli were recovered from only two. Thus we may assume that our technic for isolating bacilli from eggs was only 50 per cent effective. In this connection, it might be stated that, in examining, with the usual procedure, four yolks taken from a naturally infected hen at autopsy, tubercle bacilli were cultured from only two of them. It seems logical to suppose that if two of the yolks were found to be infected the others might very likely have contained tubercle bacilli also.

Table IV contains a tabulation of data relative to the birds whose eggs contained either the acid-fast granules or from which pure cultures of *M. tuberculosis* were isolated. It is of importance to point out that the bacilli were cultured from the eggs approximately the sixth week after the initial inoculation of the tissue emulsion into the bird.

All birds were autopsied immediately after death, careful examination being made of the reproductive organs. On May 2 all remaining birds of the flock were killed. This was necessary because the egg-production was so low that it made further work

TABLE IV—*Results of microscopic and cultural examination of artificially infected hens.*

BIRD	MODE OF INJECTION	REACTION TO TUBERCULIN TEST		TIME AFTER INJECTION BEFORE ACID-FAST GRANULES FIRST FOUND (DAYS)	EGGS FROM WHICH BACILLI ISOLATED	TIME AFTER INJECTION WHEN FIRST PURE CULTURE OBTAINED (DAYS)
		4TH WEEK	6TH WEEK			
579	Intramuscular	+++	+++	46	1	35
4590	Intramuscular	−	+++	46	1	46
4668	Oral	−	+	55	0	..
4670	Intramuscular	−	++	44	4	44
5645	Intravenous	−	++	36	3	37
7052	Intravenous	−	−	44	1	39
7173	Intramuscular	++	+	57	3	39

TABLE V—*Results of examination of birds having produced eggs showing acid-fast rods or granules.*

BIRD	REACTION TO TUBERCULIN TEST AT 6 WEEKS	RESULT (TIME AFTER INOCULATION)	AUTOPSY FINDINGS
579	+++	D. 15 weeks	Extensive lesions at point of inoculation. Many modular lesions on liver, spleen, diaphragm, peritoneum, mesentery, myocardium and semi-lunar valves of heart. Lesions in lungs. At death ovaries were non-functional. No acid-fast organisms in smears made from ovary
4590	+++	K. 15 weeks	Small miliary foci in liver and spleen. Ovaries functional
4670	++	K. 15 weeks	Miliary foci in liver. Hemorrhagic cyst-like nodule found in middle third of uterus. Smear of nodule showed typical *M. tuberculosis*. Ovaries functional.
5645	++	D. 11 weeks	Miliary tuberculosis of liver and spleen. Numerous pin-head-sized foci in lung, sections of which show many organisms. Ovaries non-functional and showing no acid-fast bacilli
7052	−	D. 11 weeks	Miliary tuberculosis of liver and spleen. Large caseous foci in lung. Ovary non-functional and shows no acid-fast organisms
7173	++	K. 12½ weeks	Small nodular lesions of liver and spleen. Caseous focus in muscle at point of inoculation. Ovaries functional. Show no acid-fast organisms

D = Died. K = Killed.

with this flock impractical. These birds were autopsied immediately after being killed. Evidence of tuberculosis was sought both macroscopically and microscopically. Table V contains the autopsy record of the seven birds whose eggs showed acid-fast granules or yielded cultures of *M. tuberculosis*.

Bird 4670 is of particular interest. Pure cultures of *M. tuberculosis* were grown from four of the eggs of this fowl which on autopsy was found to have a hemorrhagic cist in the middle third of the oviduct in which acid-fast organisms were observed. This is the only bird of the six showing any macroscopic evidence of tuberculosis in the reproductive system.

On autopsy the ovaries of the birds that lived twelve months or over were found to be functional in 57 per cent of the birds. No evidence of infection of the ovaries was observed in any of the birds used in this experiment.

II. Examination of Naturally Infected Hens for Evidence of Tuberculosis of the Reproductive Organs

Methods and Results of Study

In view of the findings in bird 4670 and some naturally infected hens brought in for autopsy, it was decided to subject our routine autopsy material to more careful examination for the presence of tubercle bacilli in the reproductive organs of hens. Thus, during the past year, the ovaries and oviducts of twelve naturally and two artificially infected birds, showing unmistakable evidence of tuberculosis, were utilized for this purpose.

At autopsy the ovaries and oviducts were removed as aseptically as possible, care being taken not to contaminate these parts with organisms from tuberculous lesions in other organs. The oviduct was severed about one inch from the cloaca to lessen the possibility of contamination from fecal material. The ovaries were well macerated in sterile mortars with a small amount of 6 per cent solution of hydrochloric acid diluted with re-distilled water. Sufficient of the acid solution then was added to bring the amount up to approximately 100 cc. The mixture then was filtered through one thickness of sterile gauze into 100-cc pyrex centrifuge-tubes. The cotton plugs, covered with a layer of sterile gauze, were replaced. After folding the protruding part of the gauze down over the top of the tube, rubber bands were applied to secure the plugs. Then the tubes were centrifuged at high speed for one hour. The oviducts were laid open longitudinally with sterile scissors and using sterile scalpels the mucosa was scraped into a mortar and treated in the same manner as the ovarian tissues. The culture medium consisted of one part of Long's synthetic medium and three parts of whole egg. To this was added 2.5 per cent of a 2 per cent aqueous solution of brilliant green. The medium was put up in long slants in tubes with a diameter of 1.8 cm. After centrifugation, there was usually, besides the sediment, a scum on the surface of the supernatant liquid. Four cultures were made from the scum and four from the sediment of each specimen. After being sealed with paraffin, these cultures were placed in the 37° incubator and held there until growth of some kind appeared or until the medium dried up.

Considerable trouble was experienced with molds. In some cases every culture had to be discarded after the first or second week and in most cases only two or three tubes escaped contamination. When all the tubes were contaminated, the cultures are so reported and when it is stated that no growth took place it

TABLE VI—*Summary of work to determine tuberculosis infection of the reproductive tracts of chickens.*

BIRD	AGE	STATE OF REPRODUCTIVE ORGANS	GROSS LESIONS*	DESCRIPTION OF CULTURES	DESCRIPTION OF STAINED SMEARS
1035	7–8 mos.	Non-productive	Caseous nodules in liver, spleen, kidney and intestine	Oviduct: Round, convex, small, brownish colonies. Ovary: Mold contamination	Acid-fast rods and granules
1036	7–8 mos.	Non-productive	Caseous nodules in liver and spleen	No growth	
1170	6 mos.	Non-productive	Swollen wattle caseous contents; showed acid-fast rods in stained smears. Tubercles in liver, spleen, mesentery and intestine	Oviduct: Round, convex, smooth, brownish colonies. Ovary: No growth	Acid-fast and non-acid-fast rods and granules
1171	6 mos.	Productive	Tubercles in liver, spleen and intestine	Oviduct: Smooth, spherical, yellowish colonies. Ovary: No growth	Acid-fast and non-acid-fast rods and granules
1267	10 mos.	Regressive	Tubercles in liver, spleen and intestine	Oviduct: Prominent, rough, granular, yellowish colonies. Ovary: Same	Acid-fast rods and granules and some non-acid-fast rods. Ovary: Same
2101	1 yr.	Non-productive	Tubercles in liver, spleen and intestine	Oviduct: Irregular, granular, whitish colonies. Ovary: Same	Acid-fast rods of short and medium length; also granules, non-acid-fast rods morphologically similar. Ovary: Same
2254	.....	Not recorded	Tubercles in liver and spleen	Oviduct: Diffuse glistening growth, colonies not well defined. Ovary: Smooth, spherical, yellowish colonies	Acid-fast rods of uneven lengths and shape; acid-fast granules. Ovary: Acid-fast and non-acid-fast rods
4690†	1 yr.	Regressive	Liver fatty and shows numerous round, light-colored, necrotic foci	Oviduct: No growth. Ovary: Tall cylindrical-shaped colonies. Brownish color	Irregularly shaped non-acid-fast rods. A few acid-fast granules

TABLE VI—*Summary of work to determine tuberculosis infection of the reproductive tracts of chickens—Continued.*

BIRD	AGE	STATE OF REPRODUCTIVE ORGANS	GROSS LESIONS*	DESCRIPTION OF CULTURES	DESCRIPTION OF STAINED SMEARS
1095	Pullet	Non-productive	Liver shows many necrotic foci; spleen enlarged 10 times, completely filled with granular caseous material; tubercles in intestine	Oviduct: No growth Ovary: No growth	
1108	Pullet	Regressive	Tubercles in liver, spleen and intestine	Oviduct: A heavy, rough, yellowish-brown growth that covers slant in about 7 days	A maze of non-acid-fast rods with extreme variations in length; some appear to be branching; many contain from one to several dark-staining oval or round bodies
1199	Pullet	Non-productive	Numerous small tubercles in intestinal wall	Oviduct: A few round colonies, oval in cross-section; light yellow Ovary: No growth	Stain very similar to 1108
1378	Pullet	Productive	Small tubercles in liver; lesion in breast muscle contained acid-fast rods	Oviduct: Dull, flat, gray growth Ovary: Mold contamination	Faintly stained acid-fast rods of varying length and breadth. Some acid-fast granules
1306	Hen	Non-productive	Tubercles in liver, spleen and mesentery	Oviduct: Dull, flat, gray growth Ovary: No growth	Clumps of distinctly acid-fast rods, quite typical size and shape; some acid-fast granules. A rather plentiful scattering of non-acid-fast rods
767†	Hen	Regressive	Numerous tubercles in liver	Oviduct: Dull, flat, gray growth Ovary: No growth	Stain same as 1306

*No gross lesions were revealed in the ovary and oviduct.

†Artificially infected hens from the second series used by Biggar in his experiments. Each hen was fed 5-cc amounts of an emulsion made from a tuberculous liver; on May 4, 6 and 9, 1932, each was given 7 cc of a tuberculous liver emulsion. On June 14, both showed a 1+ reaction to tuberculin at 24- and 36-hour observations.

means that there was not even growth of any contaminating organisms. Microscopic examinations were made of all tubes that showed any growth other than molds. The same staining method described earlier in this paper was employed. Table VI gives a summarized statement of the results obtained.

Table VI gives the approximate age of the 14 birds studied, the gross lesions in the reproductive tract and visceral organs, the results of cultures of the ovaries and mucosa of the oviducts, descriptions of colonies obtained and the microscopic observations on stained smears made from the cultures.

This table shows that no gross lesions were observed in the reproductive tracts of these 14 birds. No growth was obtained from any part of the reproductive organs in two of them. Growth was obtained from both ovary and oviduct in four, from the oviduct alone in seven and from the ovary alone in one. A microscopic study of stained smears from the cultures isolated shows that acid-fast rods and granules were present in cultures from four hens, and acid-fast rods and granules and non-acid-fast rods in cultures from five. Irregularly shaped non-acid-fast rods and a few acid-fast granules were observed in one culture. Non-acid-fast rods with extreme variation in length and shape, some apparently branching and many containing from one to several dark-staining bodies, were observed in cultures from the oviduct and ovary of one hen and the oviduct of another. A variety of types of growth and colony formation was evident. These data show that tubercle bacilli or organisms morphologically similar inhabit the ovaries and the mucosa of the oviduct of hens. Inoculation experiments will have to be completed before any definite statements can be made as to the identity and pathogenicity of these organisms.

III. An Attempt to Show Whether Eggs from Artificially Infected Hens Will Produce Infected Chicks

Methods and Results of Study

On May 4, a second series of birds was started. The eggs in this experiment were to be used primarily for hatching, to determine the transmission of the tubercle bacilli to the chick from the eggs of tuberculous birds.

This series was composed of 14 tuberculosis-free birds, all of which were in fairly good production. The same cocks were used in this experiment as in the first series. Two of the birds were given the intramuscular injection, five the intravenous, and seven

14, both showed a 1+ reaction to tuberculin at 24- and 36-hour observations.

TABLE VII—*Reactions to tuberculin test.*

MODE OF INFECTION	BIRDS TESTED	POSITIVE REACTORS	
		No.	%
Intravenous	4	2	50.0
Intramuscular	2	2	100.0
Oral	7	1	14.3

were injected by the oral route. The birds were all leg-banded and placed in coops equipped with trap-nests. Two weeks after inoculation, the birds all reacted negatively to the tuberculin test. The results of the tuberculin test after four weeks are given in table VII.

All but three of the birds reacted strongly positive to the tuberculin test after six weeks. The three negative reactors all received the oral treatment. In considering the relative speed with which sensitivity to tuberculin developed in the birds, it will be seen that intramuscular injections sensitized in the shortest time.

Eggs from this series of birds were taken from the nest, marked, and placed in the incubator. A new set was put in every third day. The chicks which were hatched were all wing-banded and raised for further observation. The eggs which failed to hatch were candled immediately and examined for the presence of tubercle bacilli. The technic use for examining the infertile eggs was identical with that used for examining the eggs of the first experiment. The eggs containing dead embryos were washed thoroughly and immersed in colloidal iodine (Chandler) for three minutes. After drying completely, the eggs were shelled and the fluid around the embryo poured into a sterile test-tube. Three smears from the fluid of each egg were made, stained and examined. The remaining fluid was then mixed with about 4 cc of 6 per cent hydrochloric acid and cultures made on slants of Petroff's and Lubenau's media.

Seventeen of the eggs which failed to hatch were examined. The smears from two of the eggs containing dead embryos showed typical acid-fast tubercle bacilli. The smears of the other eggs were negative. Unfortunately, all but three of the cultures taken from these eggs showed contamination and it was necessary to discard them. Whether the contamination was due to a greater number of organisms resulting from incubation of the egg or to an error in technique we are unable to say. No growth had been observed on the other three tubes after a growing period of four weeks.

If the above smears which were found to contain the acid-fast bacilli can be taken as evidence of the presence of *M. tuberculosis* in the eggs, the organism was found in 11.7 per cent of the incubated eggs. This figure might have been higher had not so many cultures become contaminated. This statement seems justifiable when we remember that in the first series there were no typical organisms observed in stained smears made directly from the egg, while tubercle bacilli were obtained by culturing. The fact that the bacilli were observed in stained smears made directly from the egg may be accounted for by an increase in number during incubation.

The results of these hatching experiments may be summarized as follows: Thirteen chicks were obtained from 34 eggs of artificially infected hens and 18 chicks from 76 eggs of naturally infected hens, showing about 38 and 23.7 per cent hatchability, respectively, which is very low. Whether this low hatchability was due to tuberculosis could not be definitely determined, as mold contamination prevented successful cultural examinations.

The chicks obtained were brooded and raised in such a way as to prevent infection from other sources than the egg, carefully disinfected battery brooders and storage batteries being used. Chicks were kept as long as seven months and not a single one developed typical tuberculosis.

Most of those chicks became pale and emaciated, some of them developing symptoms suggestive of rickets. This might have been due to the manner in which they were kept. Microscopic examination of enlarged joints in the legs and ribs of some of these chicks showed both acid-fast and non-acid-fast granules. A few of these bodies showed "budding" forms. The cultures made were either negative to tubercle bacilli or showed growth of other organisms, of which molds were the most frequently encountered.

IV. Cultivation of Tubercle Bacilli on Different Kind of Media Under Aerobic Conditions and 5, 10 and 15 per cent Carbon Dioxid Tension

Methods and Results of Study

In the hope of finding some way of improving our technic for isolating and growing the tubercle bacillus, we inoculated tubes containing the following media with avian, bovine and human strains:

1. Dorset's egg medium.
2. Petroff's egg medium (without gentian violet) with chicken infusion in place of veal infusion (pH 7.4).

3. Lubenau's egg medium (naturally acid).

4. Long's synthetic medium, one part, plus three parts of eggs (by weight).

5. The same as (4) plus 2.5 per cent of a 2 per cent aqueous solution of brilliant green.

Some of the cultures were incubated after being sealed merely to prevent too rapid drying. The rest were placed in anaerobic jars, one group under 5, another under 10 and a third under 15 per cent carbon dioxid tension. The results may be summarized as follows: Usually growth appeared on Petroff's egg medium a little sooner than on the others, but in time much heavier growth was obtained on Lubenau's egg medium and on the modified Long's medium. On repeated trials the modified Long's medium containing brilliant green showed the heaviest growth of the five media used. Besides promoting growth in some way, brilliant green is bacteriostatic to spore-formers, molds excepted. For example, cultures from a sputum sample (human) containing tubercle bacilli were made on the various media mentioned. All the media except Long's modified medium containing brilliant green showed growth of spore-formers after two days. The latter showed uncontaminated growth of the tubercle bacillus in about five weeks. Prior to cultivation the sputum was treated in the usual way with antiformin.

Under 10 per cent carbon dioxid tension, growth of tubercle bacilli (stock cultures) appeared in two to three weeks. Only a trace of growth was obtained in that length of time under the other conditions of cultivation. After five weeks of cultivation, there was about twice as heavy growth on the slants incubated under 10 per cent carbon dioxid tension as on those incubated without artificially introduced carbon dioxid and much more than on the cultures under 5 per cent carbon dioxid tension. At this time there was not much difference between those grown under 10 per cent and those under 15 per cent tension.

DISCUSSION

We are fully aware of the many shortcomings of this work, yet we feel that a sufficient number of interesting observations have been made to justify presentation at this time.

The fact that 13.96 per cent of the eggs examined showed tubercle bacilli seems significant, especially in view of the failure to recover tubercle bacilli from more than one-half of the eggs artificially inoculated. It seems logical to assume that if greater efforts had been made in trying to find tubercle bacilli in the 93

eggs examined, the percentage of infected eggs might have been twice as high as that recorded here.

That tubercle bacilli and lesions of tuberculosis were found in the reproductive organs in a number of cases also seems important. When, in addition to this observation, we consider the fact that chickens with intestinal tuberculosis may discharge enormous numbers of tubercle bacilli with their droppings and that there is very close communication between the oviduct and cloaca and, further, that in certain stages of the disease the bacteria have been found to circulate in the blood-stream, it seems that the chances for egg infection must be far greater than assumed by some authors. The failure or success in finding tubercle bacilli in eggs must, in some way, be connected with the stage, localization, or generalization, acuteness or chronicity of the disease at the time of examination.

As shown in table VI, none of two artificially infected and twelve naturally infected birds showed gross lesions of tuberculosis in the reproductive organs, while one or more of the other visceral organs contained such lesions, yet acid-fast rods and granules were present in cultures from four of these hens and acid-fast rods and granules and non-acid-fast rods in cultures from five other hens. Cultures from one hen showed irregularly shaped non-acid-fast rods and a few acid-fast granules. Griffith[17] has reported the finding of chronic tuberculosis infection in the udder of a goat caused by the avian tubercle bacillus, also without macroscopic evidence of tuberculosis lesions.

The fact that the finding of acid-fast granules was correlated with the finding of other evidence of tuberculosis suggests that these granules were atypical tubercle bacilli. It is even possible that some of the non-acid-fast rods and granules observed may represent stages in the life cycle of the bacillus.

The frequent contamination with molds, which materially hindered the progress of this work, may have had its source in the material examined as well as in the dust of the laboratory. The fact that many cultures became contaminated with mold after having been incubated for weeks suggests that molds may be able to enter the culture tube through the cotton plug. This is further indicated by the frequent appearance of moldy cultures in some of the anaerobic jars where the tubes remained undisturbed for several weeks. A few of the jars used gave us little trouble, while others made cultivation almost impossible. This was especially true of some tall glass jars in which a rubber tube was suspended from the carbon dioxid inlet to the bottom, for the purpose of bringing the gas to the bottom of the jar in the process

of replacing air with carbon dioxid. A paraffin seal proved more effective in preventing mold contamination than a cover of tinfoil.

SUMMARY

1. Positive tuberculin tests were usually obtained four to six weeks following artificial infection. Birds infected intramuscularly became sensitized most readily. A few birds, though infected, failed to react.

2. Acid-fast granules and otherwise morphologically atypical organisms were found in eggs and reproductive organs of infected hens. Evidence was obtained to suggest that these granules represented stages in the life cycle of the tubercle bacillus.

3. Tubercle bacilli were isolated from 13.96 per cent of 93 eggs from artificially infected hens.

4. In Raebiger's work the heaviest percentage of egg infection was found ten to 14 days following feeding of tuberculous material to the bird. The failure, in our work, to find organisms before 36 days following artificial infection of the bird was perhaps due in part to poor production and concurrent disease during the first four weeks of the experiment.

5. Tubercle bacilli were recovered from only two of four artificially infected eggs.

6. Acid-fast granules were found in eggs in 36 to 57 days following artificial infection of the bird.

7. Cultures of tubercle bacilli were obtained in 35 to 46 days following artificial infection of the birds.

8. The hatchability of the eggs from artificially infected hens was very low, while attempts to prove that chicks may contract tuberculosis from eggs of infected hens were unsuccessful.

9. Gross lesions of tuberculosis in the reproductive organs were found in three hens, two naturally and one artificially infected.

10. Cultures from apparently normal reproductive organs of nine tuberculous hens yielded cultures of acid-fast organisms.

11. Long's synthetic medium, to which were added eggs and brilliant green, gave the most abundant growth of the five media used. Petroff's egg medium showed growth in a little shorter time than the rest.

12. A carbon dioxid tension of about 10 per cent seemed to promote the growth of tubercle bacilli.

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Georgia figures its annual poultry production at $40,000,000, live stock at $72,250,000, and dairy products at $20,000,000.

PROFESSOR BANG VISITS PHILADELPHIA

Snapshot of Professor Oluf Bang, of Denmark, taken while visiting at the home of Dr. and Mrs. E. L. Stubbs, at Lansdowne, a suburb of Philadelphia.

THE MORPHOLOGY, CULTURE, ISOLATION AND IMMUNITY STUDIES OF ACTINOMYCES NECROPHORUS IN CALF DIPHTHERIA*

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Of the many infections due to *Actinomyces necrophorus*, the one which appears to give the most trouble in the state of Wyoming is the one commonly referred to as calf diphtheria. This is an acute infectious disease of calves from a few days to six or eight months of age and may occur in cattle as old as two years, although it is usually confined to those of less than six months of age. Young calves are most severely affected. The disease is characterized by the formation of necrotic areas, beginning in the mucous membranes, and later involving deeper structures in the mouth and throat. These areas vary in size, depending upon the stage of infection, individual resistance, and possibly other little understood factors, and are usually covered with a yellowish white coagulated mass of necrosed tissue.

These necrotic areas seldom, if ever, entirely heal by themselves under natural conditions and, as a result, unless satisfactory treatment is given, a large percentage of calves affected die of the disease as a result of starvation because of soreness in the mouth and throat, as a result of toxin absorption from the local lesions, or as a result of metastasis and complicating infections, resulting in pleuro-pneumonia, diarrhea with extreme weakness, or abscesses in the liver and other parts of the body.

During the past year there has been more calf diphtheria in Wyoming than in any year for the past ten or twelve. Since no satisfactory biological agent for this disease has as yet been reported, it has been the purpose of the Wyoming Station to investigate the possibility of such a preparation and in so doing to study some of the peculiarities of the causative organism, *A. necrophorus*.

One of the first difficulties to be encountered was the isolation and cultivation of the organism in pure culture. This difficulty appears to be common among a great many who have worked with the various infections caused by *A. necrophorus*. Quoting from Mattam and Carmichel[1]:

*Presented at the seventieth annual meeting of the American Veterinary Medical Association, Chicago, Ill., August 14-18, 1933.

Many attempts to isolate *B. necrophorus* in pure culture proved abortive. This failure is in accord with the experience of many others who have worked with this organism.

Kelser[2] and Buchanan and Murray[3] also state that the isolation of the organism is extremely difficult because of its strict anaerobic requirements and the fact that it is practically always present in lesions with large numbers of other organisms. As is the case in other *A. necrophorus* infections, the lesions in calf diphtheria contain in addition to *A. necrophorus* hordes of other bacteria.

Pathogenicity of Lesion Material Containing a Mixed Bacteria Flora

During the course of our attempts at isolation, material from the lesions in calves showing *A. necrophorus* was ground up in a little sterile water or physiological salt solution and 0.1 to 0.5 cc injected subcutaneously into a rabbit. The organism was kept alive from then on by repeated injections into rabbits. As soon as one rabbit died, some of the lesion from that rabbit was ground up in a little sterile water or physiological salt solution and injected into another rabbit. One strain of the organism (F), with all the contaminating organisms that would withstand the action of the animal defenses, was carried through a series of 15 rabbits, and another strain (P) through seven rabbits. The incubation period was rather constant in all rabbits injected. It was about 48 to 72 hours before the effects of the injection could be noticed. Lesions began to form at about this time, and continued to increase in size until the time of death. Emaciation was constant in all rabbits injected, the emaciation beginning about the 72nd hour and growing progressively worse until death. The time required to kill varied from three to 18 days, the average being about eight days. Repeated injections did not appear to alter the virulence as judged by the time required to kill rabbits, those in the latter part of the series withstanding the injections for about the same length of time as those of the first part (table I).

Table I—*Pathogenicity for rabbits of contaminated lesion material and pure cultures as obtained from four regions in Wyoming.*

Rabbits	Material Injected	Maximum Days Lived	Minimum Days Lived	Average Days Lived	Recovered
4	Lesion, calf	12	5	8	None
21	Lesion, rabbit	18	3	8	None
20	Pure cultures	86	6	38	7

In this consecutive inoculation of rabbits it was thought possible that the animal body might eventually eliminate the contaminating organisms; however, cultures inoculated and stained smears from lesions of rabbits in the latter part of the series showed large numbers of organisms other than *A. necrophorus*, much like those of the first part of the series.

Throughout the series of rabbits inoculated, examinations were made for lesions of internal organs. In only one case out of the two series, including 22 rabbits, were there any macroscopic lesions found, and these consisted of three small white lesions in the liver. Attempts to isolate *A. necrophorus* from these were unsuccessful.

Attempts to Isolate

As the inoculated rabbits died from *A. necrophorus* infection, attempts were made to isolate the organism by means of direct transfer of material from the lesions produced and from the heart-blood. Cultures from the lesions invariably showed growth of many contaminating organisms, but not *A. necrophorus*. Media inoculated with heart-blood failed in many instances to show growth, but when growth did occur it consisted of many contaminating organisms, none of which showed correct morphology for *A. necrophorus*. Many attempts at isolation were made by means of shake cultures, as directed by Orcutt.[4] In addition to this, many dilution and streak plates were inoculated, using serum-agar as a medium. In these the alkaline pyrogallate method of oxygen absorption was used.

A great many of these plates and shake cultures showed growth with well-isolated colonies. Many colonies were examined and isolated by transferring to tubes of cooked meat medium. No colony was formed in any which could be proven to be *A. necrophorus*. Very few showed similar morphology, and those suspicious ones, when injected into rabbits, failed to produce the disease. Some 250 or 300 colonies were isolated in this manner, several of which were injected into rabbits with negative results.

In all attempts at isolation, the inoculations were carried out as quickly as possible, to avoid any more exposure to the air than was necessary, since, as has been shown by Orcutt[4] and Hagan,[5] the air has a very detrimental effect upon this organism.

As has been previously mentioned, *A. necrophorus* in calf diphtheria is present in lesions with large numbers of other bacteria. (See figure 1.) Commonly, some of these organisms are strict anaerobes, as is *A. necrophorus*. Others are aerobic, while others

are facultative aerobes or anaerobes, so that the isolation of this organism has always been a difficult procedure. In addition to this, *A. necrophorus* is a rather delicate organism from a cultural standpoint, and unless conditions are extremely favorable, the contaminating bacteria will so far outgrow it in culture media as to obscure or prevent its growth entirely. Contaminating organisms may also outnumber it so much that, in sufficient dilution for the development of isolated colonies in culture media, there are no *A. necrophorus* organisms present.

Growth from Large Amounts of Blood

After a great deal of research, during which time all known methods for isolating this organism had been tried and found unsatisfactory in our hands, it was discovered that if large amounts of heart-blood from a rabbit nearly dead of *A. necrophorus* infection were inoculated into cooked meat medium, the organism would grow. Heretofore, attempts to isolate the organism from the heart-blood had proved unsuccessful. Since it was possible to get the organism to grow by using large amounts of blood, our previous failure to get the organism to grow from this body tissue was ascribed to the fact that only small amounts of blood (1 or 2 loopfuls) had been used in such inoculations, and possibly there were no *A. necrophorus* organisms present in such

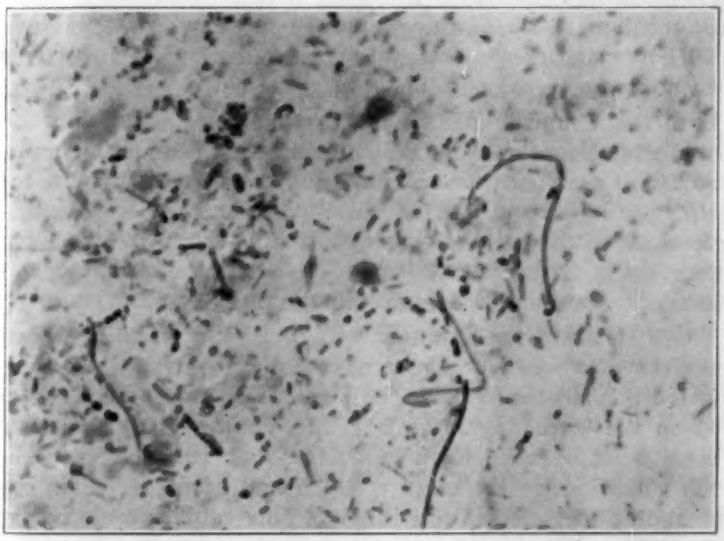

Fig. 1. Smear from a lesion in calf diphtheria showing *A. necrophorus* with many other bacteria (x 1333).

small amounts. This may also have been due to the addition of a great amount of nutrient material in such a large amount of blood. We are inclined toward the former view, however, as microscopic examination of stained blood smears from rabbits dead of *A. necrophorus* infections fails in most instances to show the organism, indicating a scarcity in this body tissue.

Believing that this was the method for isolating the organism, both the F and P strains in rabbit lesions were injected into rabbits. These rabbits developed typically and, as nearly as could be determined, were killed a day before they would have died from the infection. These rabbits were both killed, by stunning, on the seventh day after injection, and autopsy held immediately. The pleural cavity was opened as quickly as possible, the heart-wall seared with a hot spatula, and by means of a sterile syringe and needle, blood was removed without opening the heart cavities.

With the F strain 3 cc was removed, 2 cc being placed in one tube of cooked meat medium and 1 cc in another. The tube receiving 2 cc grew well in 24 hours and showed many typical *A. necrophorus* organisms upon microscopic examination. The tube receiving only 1 cc failed to show growth at the end of 96 hours, so was discarded. With the P strain of the organism 2 cc of heart-blood was inoculated into each of the two tubes of cooked meat medium. Both of these tubes of medium grew vigorously in 24 hours and showed many typical *A. necrophorus* organisms upon microscopic examination.

Both the F and P strains of the organisms were allowed to grow for 48 hours and the F strain injected into another rabbit. This rabbit developed typically, and on the sixth day, being near death, was killed and 2 cc of heart-blood removed aseptically to each of two tubes of cooked meat medium, both of which grew vigorously in 24 hours and showed many typical *A. necrophorus* organisms upon microscopic examination.

The P strain of the organism was carried in stock by repeated transfers every two or three days for ten days, when it was injected into another rabbit. This rabbit developed typically and died on the sixth day after injection, showing a typical lesion. We accidentally failed in this case to obtain the heart-blood in a fresh condition, so the culture which had been carried in stock was again inoculated into a rabbit. This rabbit developed typically and was killed on the seventh day. Two cc of heart-blood was removed aseptically to each of two tubes of cooked meat medium,

both of which grew vigorously in 24 hours, showing many typical *A. necrophorus* organisms upon examination.

Agar Colonies Obtained

Both the F and P strains of the organism had thus been cultured from the heart-blood of two successive rabbits and, although showing many coccoid forms as described by various authors, were considered to be pure cultures. Subsequent examination, however, led us to believe that the cultures were not pure, so the F strain was transferred for three successive times at 24-hour intervals and inoculated serially into shake cultures of double strength beef-infusion agar, with 10 per cent sterile serum added. Inoculation was carried out as quickly as possible at 50° C. and the agar cooled immediately by standing it in a cold water-bath. At the end of a 5-day incubation period at 37° C., good growth had occurred in all tubes, the third dilution tube showing about 20 well-isolated colonies. Twelve of these colonies were fished into cooked meat medium and 1 cc of sterile serum added to five of these tubes. (In removing the agar column from the culture tube the procedure is greatly facilitated by carefully filing the tube at about a half-inch from the bottom, until it cracks. The bottom of the tube is then carefully flamed so as not to melt any of the agar and the bottom removed. By means of a large glass stirring rod which has been passed through the flame to burn off contaminating bacteria, the column of agar can be pushed out of the bottomless tube from the top into a sterile Petri dish or other sterile container with a transparent lid, for the fishing of colonies.)

Forty-eight hours later, five of the colonies fished into cooked meat medium had grown. These were the five to which serum had been added. A control tube of serum remained sterile. Each tube showing growth showed typical *A. necrophorus* organisms. One was selected which showed a high percentage of *A. necrophorus* morphology, and transferred once. This 24-hour transfer was injected into a rabbit, which died in 72 hours, showing a typical beginning necrosis at the point of injection. Microscopic examination of the lesion showed many typical organisms. This culture was then carried in stock by repeated transfers for 30 days, at which time microscopic examination showed very few *A. necrophorus* organisms but mostly all cocci with a very few short rods. Thinking that possibly the organism had assumed the coccoid form, as reported by some workers, it was injected into a rabbit. This rabbit failed to develop a lesion, however, so this culture was discarded as not containing *A. necrophorus*.

This led us to believe that the original colony fished had not developed from a single organism. On further analysis it was apparent, since this organism forms such long chains or threads, that it would be likely for one such organism to become entangled with other organisms nearby and the resulting growth from both appear as one colony. Since, unless conditions are extremely favorable, *A. necrophorus* grows rather slowly, it was thought that, by repeated transferring, the contaminating coccus had outgrown it and crowded it out. We have not had opportunity to prove this contention; however, it was later shown that by guarding against this difficulty the trouble could be eliminated.

Old cultures of this F strain of the organism were examined and one was found which upon transfer showed typical *A. necrophorus* organisms. This culture was inoculated serially into double-strength, beef-infusion serum-agar in shake cultures. Isolated colonies growing anaerobically developed in 72 hours, and microscopic examination showed several of them to contain typical *A. necrophorus* organisms. Four of these colonies were fished into cooked meat medium and 10 per cent serum added to each. In 24 hours all had grown, showing typical organisms, so one of these cooked meat cultures was again inoculated serially into shake cultures in order to double-check the purity. At the end of seven days of incubation, about 12 colonies had developed in the second dilution tube. All were growing anaerobically and all showed the same morphology and structure. This morphology and structure consisted of spherical, whitish colonies about 10 mm in diameter and upon closer examination with a hand lens the surface of each appeared rather rough, so that the entire colony gave a rather cottony appearance, much as described by some authors for this organism. Microscopic examination of these colonies revealed large, beaded, typical *A. necrophorus* organisms, and when fished into cooked meat medium with 10 per cent serum grew luxuriantly in 24 hours and showed typical organisms in such cultures.

Steps in Isolation of a Pure Culture

This led to the formulation of a set of steps to be followed in the isolation of this organism and, although the number of isolations we have attempted has so far been rather limited, we have not failed in any attempt to isolate the organism from material which we were certain contained it, when following these steps. These are as follows:

1. Subcutaneous injection of the material containing the organism into a rabbit.

2. Destruction of this rabbit a few hours before death would occur naturally and aseptic removal of 2 cc of uncoagulated heart-blood to each two tubes of cooked meat medium. These cooked meat cultures to be incubated 24 hours, or until growth has occurred, as determined by microscopic examination.

3. The serial inoculation of serum-agar shake cultures from these cooked meat cultures with subsequent development of well-isolated colonies, growing anaerobically. This requires at least 72 hours of incubation.

4. Fishing of colonies showing typical *A. necrophorus* organisms from shake cultures of (3) above into cooked meat medium with 10 per cent serum added, and incubated until growth has occurred. This usually requires 18 to 24 hours.

5. The serial inoculation of serum-agar shake cultures from these cooked meat cultures of (4) above with subsequent development of anaerobic, well-isolated colonies showing typical *A. necrophorus* organisms. All colonies developing should show the same form and structure, with the possible exception of those growing within ½ to ¾ inch of the top of the agar column, which may be somewhat altered from oxygen absorption from the air. The incubation period should be not less than seven days, to allow all colonies to develop fully.

6. Fishing of such colonies into cooked meat medium with 10 per cent serum added with resultant growth, showing typical *A. necrophorus* organisms. This culture to be considered pure.

7. Unless under (5) above all colonies developing show the same form and structure (with the exceptions noted), those colonies which show typical *A. necrophorus* organisms shall be inoculated into cooked meat medium with serum and again reinoculated serially into serum-agar shake cultures. This procedure to be repeated until such time as all colonies developing are well-isolated, anaerobic, and show the same morphology and structure.

After these rules for isolation had been formulated, the P strain of the organism was isolated in this manner. It was necessary with this strain, however, to repeat the shake culture before obtaining the correct colony formation. Later, the organism was isolated from two other cases of natural infection in calves and from one artificially infected calf in this manner. The ones isolated from natural infection were given the letters S and H, thus giving us four strains of the organism, *i.e.*, F, P, S and H, each of which was obtained from widely separated parts of the state.

Pathogenicity of Pure Cultures in Rabbits and Calves

As soon as the various strains of the organism were isolated, they were inoculated into rabbits. A number of rabbits were so injected at various times and, although there was some variation in results, in general it was found that the organisms when injected in pure culture were always virulent but did not always produce death. The time required to kill rabbits was on an aver-

age greatly increased. In those which the cultures failed to kill large lesions were produced in from three to five days, which ruptured and continued as chronic, abscess-like affections for periods up to five or six months. From the periphery of such lesions *A. necrophorus* could be demonstrated. In table I, 20 rabbits are shown as having been inoculated with pure cultures. This does not include 26 rabbits which had been inoculated previously with filtrate and bacterin before the cultures were injected. These rabbits all developed lesions from the injection of cultures, so that the cultures have shown themselves to be pathogenic in a total of 46 rabbits. The cultures isolated were found to be virulent for calves also. This will be referred to later.

There has been no opportunity to investigate thoroughly the rôle of secondary invading organisms; however, from our limited amount of work on this phase, it appears that these organisms may play a very important part in both natural infection in calves and artificial infection in rabbits.

MORPHOLOGY AND STAINING CHARACTERISTICS

This organism is a pleomorphic rod or filament varying in length from one or two microns to filaments over a hundred microns long. The width is variable, but not nearly to the same extent as is the length. This varies from around 0.5 to 3 microns, except for some rather large swellings occurring in the longer filaments, these enlargements sometimes reaching 8 or 10 microns in diameter. The size of the filaments appears to depend upon the age of the culture examined, the length of the time the organism may have been exposed to the air, and possibly other little understood factors.

In young cultures 18 to 36 hours old, a large number of long, thick filaments, mostly beaded, may be found. Often it is possible to demonstrate a long filament which does not stain beaded; however, these are the exception rather than the rule. In the same culture it is also possible to find many shorter rod forms, many of which are beaded or barred, and of a width considerably less than that of the longer filaments. Occasionally a very short rod, so short as to appear almost coccoid, may be found. However, these are not common and their number is not sufficiently great to make them of any importance in work with this organism. Quite often these shorter forms show distinct bipolar staining. (See figures 2 and 3.)

The presence of enlargements in the longer filaments is common in young, newly isolated cultures. What the significance of

these enlargements is, we are unable to say; however, it is probable that they are simply involution forms. (See figures 4, 5 and 6.)

In older cultures, the organism loses the long, beaded appearance and assumes a shorter, thinner morphology, mostly beaded rods of approximately ¾ to 1 micron in diameter and averaging around 8 or 10 microns in length, although both longer and

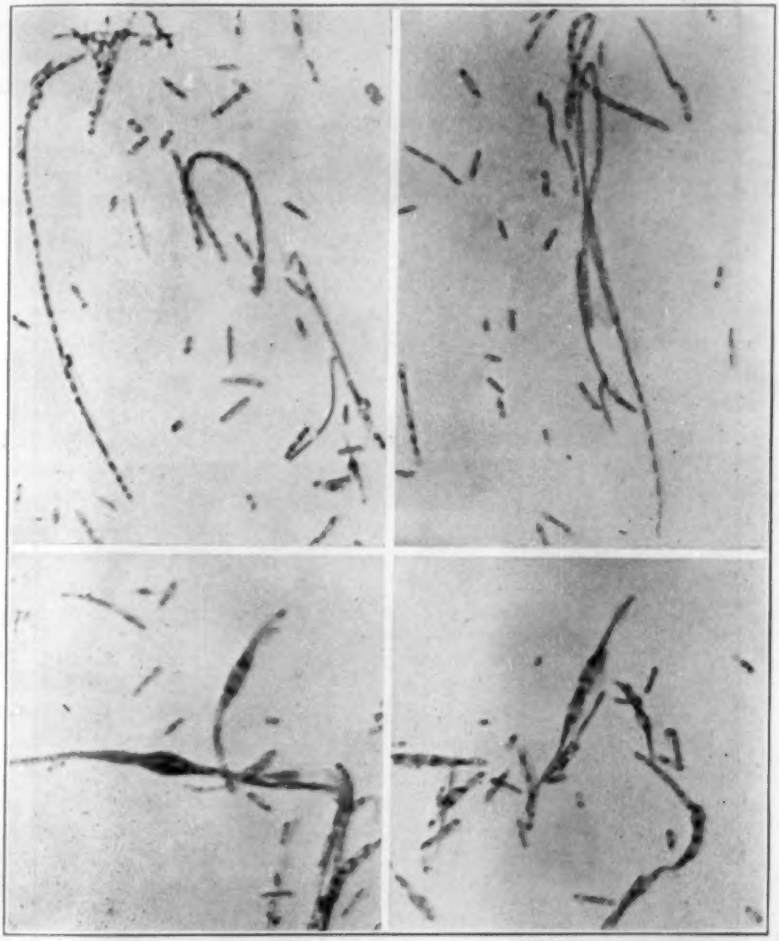

FIG. 2 (upper left). *A. necrophorus* in pure culture (x 1375).
FIG. 3 (upper right). *A. necrophorus* showing the lengthy filaments commonly attained in young cultures (x 1333).
FIG. 4 (lower left). Involution forms of *A. necrophorus* in young pure cultures (x 1350).
FIG. 5 (lower right). An involution form from a pure culture apparently dividing (x 1333).

shorter forms are common. Involution forms were not found in such cultures. (See figure 7.)

How the long filaments are able to assume the shorter, thin-

FIG. 6 (above). Young culture of *A. necrophorus* showing beaded and evenly stained filaments (x 1375). (Note large involution form.)
FIG. 7 (below). Characteristic morphology of *A. necrophorus* in old culture (x 1333).

ner appearance of older cultures, we are not prepared to say. It is probable that they do so by breaking up into shorter component parts. We have been unable to demonstrate unmistakable evidence of branching.

The organism stains well with the ordinary morphology stains and is Gram-negative. For demonstrating the beaded appearance we have used dilute carbol-fuchsin almost exclusively, with excellent results. This should not be left on for very long periods, however, as the organism will stain homogeneously if the staining period is prolonged.

Some Cultural Characteristics and Media

As has been previously mentioned, this organism is rather delicate from a cultural standpoint and unless conditions are extremely favorable it refuses to grow in the usual laboratory media, or if it does grow it does so rather poorly. It grows well in double-strength, beef-infusion agar to which has been added 10 per cent sterile filtered serum, provided the pH is around 7.0 and the organism inoculated has not been exposed to the air for too long a period. It does not grow so well in a single-strength agar or in glycerin agar, even though serum is added. We have been able to get the organism to grow in agar only when it is used in shake cultures so that air is mechanically excluded. Then the organism will not grow in the top of the agar for ½ to ¾ inch because of oxygen absorption from the air. Our attempts to grow the organism in plate cultures using the alkaline pyrogallate method of oxygen absorption for establishing anaerobic conditions have been entirely unsuccessful, although the same serum-agar was used as was used in successful shake cultures.

Colonies in agar shake cultures are usually visible in 36 to 48 hours. These continue to increase in size up to about the fifth to seventh day, at which time there appears to be no further increase. In our work we have found two types of colonies, either of which may be formed by a single strain of the organism. However, we have not found both types occurring in the same culture. The first type is a whitish, spherical colony, 8 or 10 mm in diameter, with a rather rough surface, so that it gives the rather cottony appearance described by some authors for this organism. The second type colony first appears as a minute disc, grayish white, and continues to increase in size as such. As it attains its maximum size of 8 or 10 mm in diameter, it assumes a somewhat umbrella shape which is not changed regardless of prolonged incubation.

In the colony formation from the same strain of the organism it appears that the type of colony first mentioned is more apt to form in agar cultures of newly isolated organisms, while the latter mentioned type of colony is likely to form from cultures which have been carried on artificial media for some time. The medium also may be a factor in determining the type of colony formed; varying amounts of nutrient material or slight differences in pH values might easily be the cause. Possibly the rough and smooth colony variants of the organism may exist. We have not had opportunity to investigate this problem.

The organism will grow in broth provided steps are taken mechanically to exclude air in such manner that the broth is at no time allowed to come in contact with it, and the pH of the broth is 7.0. Several attempts to grow the same cultures in such media with a pH of 6.8 and 7.2 met with failure. The addition of 10 per cent sterile serum will cause the organism to grow in broth of pH ranges of 6.8 to 7.6. Anaerobic conditions may be maintained by means of a paraffin or petrolatum seal. The broth becomes uniformly clouded in about 48 hours and begins to clear in about six days, the organisms settling to the bottom as a grayish white sediment, until the medium is almost entirely clear. Some gas usually is formed, depending upon the strain used, or possibly upon varying constituents of the medium.

Our standard medium for growing and maintaining the organism in stock culture is cooked meat or meat mash medium. This is prepared as directed by Wadsworth[6] with certain rather important modifications. If the medium is to be tubed, twice as much water or broth as meat is used. Peptone and sodium chlorid may be added but we have not found it necessary to do so. The meat and water mixture with about 40 cc of N/1 NaOH per 500 grams of meat are infused in the ice-box overnight, then cooked for about two hours in the Arnold steam sterilizer, stirring occasionally. The mixture is then brought to a boil over an open flame and after settling for a few minutes some of the broth is removed for titration. It is not necessary to filter this broth. The reaction of the medium is adjusted to about pH 7.3 or 7.4 and the medium autoclaved at 121° C. for 30 minutes. After autoclaving, the medium is placed in the ice-box to allow the fat to harden. The fat then is skimmed off, the medium brought to a boil in the Arnold or over an open flame, and the reaction again adjusted to 7.3. It is then tubed and sterilized at 121 degrees for 45 minutes. After sterilization, it is well to check the reaction of the medium, which should be about pH 7.0. This reaction appears to be optimum for this organism.

If the medium is not used immediately after sterilization, it is well to heat it in the Arnold or in a water-bath for 20 or 30 minutes, and cool in a cold water-bath just before using, in order to free the medium of any absorbed oxygen.

A. necrophorus will grow well in this medium, usually showing growth in 24 hours. Sometimes it is necessary to add 10 per cent serum to this cooked meat medium, particularly when fishing colonies from agar shake cultures into it, because for some reason the organism will refuse to start in cooked meat alone, although once started they grow well. In maintaining stock cultures it is advisable, particularly when changing from one batch of medium to another, to watch the cultures rather closely to make certain that they grow, and add serum if necessary to get them started in that particular batch of medium. Otherwise those cultures which do not produce gas may easily be lost.

All of our cultures except one have consistently produced gas in this medium, although this characteristic was much more pronounced when the cultures were newly isolated than at the present time. The one culture produces gas occasionally but has never been constant in this respect. After incubation for five to seven days in this medium, the organism partially digests the meat particles, and the broth above begins to clear. Digestion of the meat continues as the time of incubation increases, until in cultures two or three weeks old the meat becomes a homogeneous mass in the bottom of the tube, occupying much less space than formerly, leaving a rather tall column of fluid above.

Aggressin

In an attempt to produce an aggressin for rabbits, a large necrotic lesion from rabbit 32-36 was ground up in a sterile mortar and all possible juice pressed out. It was found necessary to dilute this fluid with four parts of sterile saline solution in order to get it through a porcelain filter. After satisfactory controls had shown this diluted, filtered fluid to be sterile, it was injected subcutaneously into rabbits 33-1 and 33-2, in 2 cc and 5 cc doses respectively, with no ill effects. Thirty-five days later, both rabbits were injected with 1 cc of culture of the same strain responsible for the original lesion in rabbit 32-36. Rabbit 33-2 died in 20 days with *A. necrophorus* infection and rabbit 33-1 died in 30 days from the same cause.

With this rather inadequate investigation the attempted production of an aggressin was abandoned because of the nature of

the disease in the important domestic animals, and the impracticability of production in any large amount.

Filtrate Production and Use in Rabbits

Some preliminary work at the Wyoming Station, as previously reported by Elder *et al.*,[7] indicated that a filtrate produced from cultures of *A. necrophorus* might possibly be of some value for immunizing rabbits against the disease. It was decided to investigate this possibility rather thoroughly. In preparing the filtrate the same cooked meat medium was used as was described for tubes of the same medium, except that only half as much water or broth was used. Instead of being tubed, however, this medium was sterilized in large flasks.

One and 2-liter flasks of this medium were heavily inoculated with different strains of the organism, sealed, and incubated at 37° C. In these large flasks the organism started producing gas in from 24 to 36 hours and continued gas production for periods up to 60 to 70 days. In the production of this filtrate the different flasks were allowed to incubate for about 70 days, at which time the fluid was pressed out of the meat and sterilized by filtering through porcelain filters.

This filtrate then was injected into rabbits, and although we have not tried intravenous inoculation, subcutaneous and intraperitoneal injections failed in every case to produce any evidence of toxic disturbance as described by Orcutt[4] and Weinberg and Ginsbourg.[8]

From this injection of filtrate into rabbits it appears that the filtrate might possibly be of some benefit in protecting rabbits, although just how much is questionable. The fact that lesions

Table II—*Filtrate in rabbits.*

Rabbits Used	Filtrate Injections				Culture Injection		Rabbits Died†
	First		Second*				
	Amount (cc)	Method	Amount (cc)	Method	Amount (cc)	Interval (Days)	
2	10.0	Sub.	10.0	Sub.	1.0	10	1
2	5.0	Sub.	5.0	Sub.	1.0	10	1
2	1.0	Sub.	1.0	Sub.	1.0	10	1
2	5.0	Intrap.	5.0	Intrap.	1.0	10	0
3	10.0	Sub.	....	....	1.0	20	0
3	5.0	Sub.	....	....	1.0	20	0
3	1.0	Sub.	....	....	1.0	20	1
3	5.0	Intrap.	...	...	1.0	20	2
10	Controls				1.0	..	4

*Ten days after first injection.
†All developed lesions.

were produced in all rabbits injected and that not all of the control rabbits died would seem to indicate that the filtrate had little immunizing power. However, on further analysis it will be noted that out of the ten control rabbits injected, four died in an average of nine days each, while in those rabbits which were injected with filtrate before infection, only six died out of 20 in an average of a little over 19 days.

Filtrate and Cultures in Calves

Four calves were used for study of the filtrate, and of the pathogenicity of our cultures in calves. Calf 4 was artificially infected with pooled cultures of the organism by swabbing scarified areas, and by injection of small amounts of the culture into the submucous tissue of the tongue and lips.

In three days, an examination of the mouth showed a yellowish white necrotic tissue over the scarified areas. The points at which the injections had been made appeared to be healed over. Later on, however, the injected areas became necrotic, so that in ten days all injected areas were showing considerable necrosis. From about the fifth to the tenth day, the calf appeared to be somewhat depressed, with little appetite, after which time it began to improve and apparently made complete recovery from the *A. necrophorus* infection 35 days later, only to contract an acute rhinitis which proved fatal. Aside from the lesions of acute rhinitis, nothing abnormal could be found at autopsy, with the

Table III—*Pathogenicity of cultures and effect of filtrate in calves.*

Calf	Pooled Filtrate Subcutaneously		Pure Culture Injected into Tongue, Lips and Gums	Results
	Amount	Date		
1	10 cc	May 10	June 1	Lesion at each point of injection completely healed in 25 days
2	10 cc 10 cc	May 10 May 20	June 1	Lesion at each point of injection except on gum. All lesions produced completely healed in 25 days
3	None		June 1	More acute lesions produced than in calf 1 or 2. Some systemic disturbance 5th to 10th days. Lesions completely healed in 40 days
4	None		May 10	Lesions produced at injected and scarified areas. Some systemic disturbance 5th to 10th days. Lesions healed in 35 days. Dead of acute rhinitis June 24

possible exception of a slight yellowish color of the liver. Microscopic examination did not reveal *A. necrophorus*.

In order to make certain that *A. necrophorus* was responsible for the artificially produced lesions in the calf, smears were made from the lesions at various times, all showing typical organisms. Emulsified material from the lesions was injected also into rabbit 33-42. This rabbit developed typically for rabbits injected with contaminated necrophorus material and was killed on the tenth day after injection in order to obtain heart-blood for isolation of the organism. The isolation procedure as outlined previously was followed and a pure culture of *A. necrophorus* was isolated from this calf.

Calves 1 and 2 were injected subcutaneously with filtrate, and calf 3 was used as a control.

Each of these calves developed lesions at the points at which cultures were injected. Lesions in calves 1 and 2, however, did not appear to be as acute as those in calf 3 and the injection into the gum of calf 2 failed to produce any lesion. The systemic disturbance was noticeable in calf 3 only. The lesions in calves 1 and 2 were completely healed in 25 days, while those in calf 3 were not completely healed until 15 days later.

Whether or not the filtrate has any protective powers against artificial infection with pure cultures in calves is problematic, although the results in this case seem to indicate that it may be of a little value. The difference in numbers of organisms of the initial dose in natural and artificial infection may be sufficiently great that the filtrate would protect against natural infection.

TABLE IV—*Bacterin in rabbits.*

Rabbit	Bacterin Injections				Culture Injection		Results
	First		Second*				
	Amount (cc)	Method	Amount (cc)	Method	Amount (cc)	Interval (Days)	
33–43	1.0	Sub.	1.0	Sub.	1.0	10	Large lesion
33–44	5.0	Sub.	5.0	Sub.	1.0	10	Small lesion. Healing
33–45	10.0	Sub.	10.0	Sub.	1.0	10	Dead 18 days later
33–46	1.0	Sub.	....	....	1.0	20	Large lesion
33–47	5.0	Sub.	....	....	1.0	20	Large lesion
33–48	10.00	Sub.	....	....	1.0	20	Large lesion
33–49	Controls				1.0	..	Large lesion. Emaciated
33–50					1.0	..	Large lesion. Emaciated

*Ten days after first injection.

Further work along this line is anticipated and it is hoped that field results will be more conclusive.

Bacterin in Rabbits

At the time the above filtrate was prepared, some of the fluid from the flask cultures after filtration through cotton only was preserved with 0.5 per cent tricresol and held in the ice-box for 60 days. At the end of that time, this bacterin was pooled and injected into rabbits. Only one rabbit showed any effects of the injection of the bacterin and that consisted of a small lesion at the point of injection, which developed in about five days after the injection of 10 cc of the bacterin. This lesion had completely disappeared at the time of the second injection of bacterin ten days later, and no further disturbance could be noticed until after the injection of the culture.

In this work with bacterin, all rabbits injected developed lesions. The two control rabbits developed typically, large lesions forming which ruptured in about ten days, and although considerably emaciated are apparently on the road to recovery. The rabbits which received bacterin were a full week longer in developing lesions than were the controls, although they were all injected at the same time. The emaciation is much more marked in the control rabbits than in the others. These may become emaciated later as, with the exception of rabbit 33-44, the infection appears to be at its height at present writing, 20 days after infection, whereas the infection apparently reached its height in about 10 days in the control rabbits. The lesions in the rabbits receiving bacterin attained approximately the same size as those in the control rabbits.

The delayed production of lesions in these rabbits would seem to indicate that the bacterin had stimulated the production of a slight amount of immunity in the body tissues, and further work with the bacterin under field conditions in calf diphtheria is contemplated.

Summary and Conclusions

1. Methods described in various publications for isolating *A. necrophorus* in pure culture are not wholly satisfactory.

2. A method is described which in our experience is satisfactory for isolating the organism from cases of calf diphtheria.

3. Four strains of the organism have been isolated in pure culture.

4. The four strains always produce lesions in rabbits when injected subcutaneously in sufficient quantities, although the mortality is comparatively low.

5. The four strains when pooled are pathogenic for calves when inoculated into the submucous tissues or onto scarified areas of the mucous membrane of the mouth.

6. The virulence of pure cultures is much less than that of lesion material containing a mixed bacterial flora when injected into rabbits. The rôle of secondary invaders may be an important one.

7. Lesions in internal organs of rabbits injected subcutaneously with material containing *A. necrophorus* occur very rarely.

8. Long, beaded filaments of young, actively growing cultures assume a shorter, thinner appearance as the culture grows older. The organism does not assume coccoid forms. Involution forms are described.

9. Filtrates prepared from pure cultures of the organism do not contain sufficient toxin to affect rabbits when injected subcutaneously or intraperitoneally.

10. The organism does not produce a toxin sufficiently strong to affect calves when filtrates of the organism are injected subcutaneously.

11. The subcutaneous and intraperitoneal injection of filtrate prepared from the four strains of the organism is of questionable value in protecting rabbits and calves from artificial infection with the organism.

12. The subcutaneous injection of a bacterin into rabbits is of questionable benefit against artificial infection with pure cultures of the organism.

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SURGICAL AND MEDICAL PROCEDURE IN THE TREATMENT OF EXTERNAL DISEASES OF THE EYE IN VETERINARY PRACTICE*

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The ophthalmologist for humans cannot transfer his clinical and pathological information to the visual organs of dogs without certain restriction. The anatomy of the adnexae and globes are different in the two species. So the nictitating palpebra of the dog is represented by the plica semilunaris in man; the incompleteness of the human bony orbit is more marked in dogs. The functional examination in man is a most important field, where mathematical precision is possible and requisite. In dogs this is only partially possible or necessary and we rely mainly on the anatomical approach and cruder psychometric tests. The dog has slight accommodative power and therefore his eye is not liable to suffer from malignant myopia, amblyopia ex anopsia, and other refractive errors, which are so important in man.

In the field of special pathology it is of importance that syphilis, gonorrhea, trachoma and acute exanthema do not affect dogs. The deleterious effects of tobacco, alcohol and spices are not liable to damage the eyes of the dog. Finally, the demands and benefits of human society affect differently the eyes of the two species. For instance, inbreeding and prevention of senility by euthanasia are frequent in dogs and therefore familial retinitis and nyctalopia must be more frequent, and senile chorioretinal changes less frequent in the dog than in man.

At the objective examination of dogs, the examiner must protect himself and it may be necessary to have an assistant hold down the animal, tie its mouth or administer anesthesia. The same is true in human ophthalmology with babies and psychopathics. Nevertheless, gentle, firm, rapid approach will help frequently to do without anesthesia. Direct examination in ordinary daylight will frequently show more manifest changes, such as leucomata and malposition of the eyelids.

The oblique, focal illumination without or preferably with the lupe is an excellent means to observe the condition of the lids, conjunctivae, anterior segment and anterior chamber of the eye. Instead of an ordinary electric bulb on a stand and a biconvex

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condensing lens, I recommend a small ophthalmoscopic light with a hand battery. The usefulness of the ophthalmoscope in the diagnosis of external diseases is limited and therefore I omit discussing this important aid of endocular diagnosis.

The discussion of the diseases of the iris lies outside of my subject. Therefore, I limit myself to remark that at observing the pupil and the pupillary margins we must consider the normal size and shape of the dog's pupil, the motility of the iris and the possible synechiae or adhesions of the iris to the cornea or the anterior lens capsule. Furthermore, the effect of certain drugs must be considered. A practitioner, who previously has treated a case, may have instilled atropin solution and thereby dilated the pupil or employed eserin solution and so constricted the pupil.

The digital or instrumental examination of the intraocular tension is essential. All serious inflammations, and so the corneal ulcers and scleritis, may cause secondary glaucoma. The occurrence of this complication must be remedied frequently with surgical treatment. If the diagnosis is not prompt, blindness will result, the animal will suffer intolerable pain and serious cosmetic defect may result (buphthalmos or postglaucomatous degeneration of the globe).

For the ophthalmologist the most striking details, wherein the eyelids in the dog and man differ, are the following: The third palpebra of the dog is represented as the plica semilunaris in man. The cutis is provided with soft and thick hairs, which in man are absent. The skin of the dog's orbital region shows numerous stiff hairs (Tasthaare) which are supplied with striated muscle fibers.

The congenital malformations are rare. Supernumerary upper eyelid has been reported by Heichlinger in 1894. A few cases of coloboma have been described. The treatment is surgical. The technic is simple. Textbooks of human ophthalmological surgery abound in recommendations of procedure. These may be considered as a starting point, but at the execution it is good to take the special problems of an individual case in consideration and use suitable modifications.

The cutaneous layer of the lid may participate in diseases of the common integument. Besides requiring treatment *per se*, these are important as congestion of the conjunctiva or conjunctivitis may result. Traumatism may cause subcutaneous hemorrhages with or without discontinuity of tissue. Emphysema of the skin is rare, but may occur when the nasal or paranasal skeleton participates in the trauma. Edema may be present as a

sign of early dermatitis or, secondarily, following orbital, intracranial or cardiovascular disease. Hemorrhagic diathesis, deficiency diseases, diabetes and thyroid disease also may affect the cutis of the lid.

Eczema of the palpebral skin may be secondary either to conjunctivitis and marginalis blepharitis or eczema capitis. Acne, furunculosis and phlegmon also may spread from the neighboring skin regions.

Fungous Dermatoses

Favus, tinea favosa (caused by *Achorion schoenleini*), herpes tonsurans (caused by *Trichophyton tonsurans*) are important dermatoses, caused by fungi, because these diseases may be transferred from dog to man and other species. Microscopic examination of parts of the diseased tissue is important. When diagnosis has been made early, the prognosis is favorable. The treatment consists of careful cleansing of the site of the lesion and the application of creolin, unguentum cinereum or dilute carbolic acid solution.

Certain mites, such as dermatophagus, acarus and sarcoptes, occur on the cutis of the lid as well as elsewhere on the cutis in dogs. These diseases also may be transmitted to man. The prognosis depends on localization of the process. The general condition may suffer, if the alimentation of the animal fails. The treatment consists of isolation, shaving of the affected region of the skin, cleansing and application of sulfur, creolin, lysol, balsam of Peru, unguentum cinereum, etc., to the affected regions of the skin.

Another class of the arthropods, namely insects, may also infest the lids; such are the Pupipara, mosquitoes, flies and lice. *Cysticercus cellulosae* occurs very rarely.

Refractive anomalies and claims of civilized life on the visual organ of man frequently serve as partial causative factors in the production of chalazions, marginal blepharitis and hordeolum. In dogs these diseases are rare. Occasionally surgical treatment will be indicated. This consists of the incision of hordeolums and incision and curettement of chalazions. Marginal blepharitis may lead to malposition of the cilia and free lid margins, necessitating operations which cannot be considered wholly as plastic.

The eyelids mainly protect the eyeball, provided that the lid margins closely hug the eyeball. As soon as apposition is impossible, the anterior segment of the eye is exposed to foreign bodies, dryness, infection. etc., regardless of what may have caused the malposition. The treatment of marginal blepharitis consists of

the removal of the crust from the lid margin, without removing the cilia, except those which are directed toward the eyeball, application of 2 per cent tincture of iodin in the ulcerative and of 1 per cent yellow oxide of mercury in all cases.

Malpositions may be caused by maldevelopment, innervational disturbances, traumatisms, inflammations, cicatrization, neoplasms in or near the lid, tissue changes due to senility, etc.

Entropion and Ectropion

Entropion and ectropion occur in dogs. When some acute eye disease, foreign body or conjunctivitis causes it, the underlying disease should be treated. In chronic cases simple and effective operations are available. Ziegler cautery puncture, excision of a narrow band of the musculus orbicularis palpebrae and the Kuhnt-Symanowsky operation are some of those which I find most effective.

Paralytic or senile lagophthalmus can be very successfully corrected with Davis' modification of the Kuhnt-Symanowsky operation. However, when there are cicatrices, binding down the palpebra to the skin over the zygoma, an atypical operation must be done with skin transplants from the neighboring healthy regions of skin. There are excellent operations devised for correcting ptosis.

Injuries of the eyelids should be treated with aseptic bandages, preceded by atypical excision, suturing, etc. When the orbit or the orbital contents also are injured, naturally attention must be given to those parts in the first place. In uncomplicated cases and after plastic operations, it is important to apply the bandage so that no pressure should be applied on the eyelid or eyeball because the pressure on the former would spoil the result of the operation and pressure on the latter might seriously damage the visual organ.

The third or nictitating palpebra is a very interesting adnexal organ. It is situated at the internal canthus and consists in the main of the Harderian sebaceous gland which lies partly under and partly near to the intero-inferior orbital margin and of a hyalin cartilage which projects up and out when the dog causes the choanoid and retractor muscles to function. The inferior oblique and Mueller's muscles cause the return of this palpebra into the position of rest. A lump of adipose tissue is present on the outer surface of the globe, between the internal and interior rectus muscles, to protect the globe against the impact of this powerful structure.

The diseases of this nictitating palpebra are not different from the diseases of the two other lids, but I call attention to one interesting disease: In such species, where the upper and lower lids closely hug the globe, the third lid is not well developed and larger animals suffer less with onglet than smaller animals, with heads closer to the ground. Saint Bernards and Newfoundlands have very loose palpebrae and these species have tremendously developed third lids. Onglet is a disease, characterized by prolapse of the third lid. This is frequent in the Pekingese. The treatment of reposition, of temporary paralysis of the palpebral orbicularis and occasionally of excision of the third lid.

Tumors of Lids and Conjunctiva

Various benign and malignant tumors do occur on the lids and conjunctiva. When diagnosed early, these can be treated easily with surgical or radiological means. These curative procedures occasionally require restorative surgery later on.

In reference to the conjunctiva, for the practitioner the most important point is that the upper and lower fornices must be inspected for diagnosis and treatment, if he wants to arrive at cure.

A similarly important point is to differentiate between ciliary and conjunctival injection. The former is a most important sign of ocular disease. Conjunctival injection or hyperemia is strongest on the tarsus and lessens toward the sclerocorneal limbus, it is pink in color, the vessels are undulating in shape, superficial, movable and anastomosing. The ciliary injection is strongest at the limbus, is situated deeply, the vessels are dark red, straight, not intercommunicating, and they penetrate the cornea occasionally.

Trachoma, gonorrhea, syphilis, diphtheria and the exanthematous diseases do not occur in dogs, although these are of the first importance for the human conjunctiva. Similarly, the Koch-Weeks, Friedländer and diplobacilli and the Gram-positive diplococci are not pathogenic for dogs.

The catarrhal, blenorrhoic, follicular, croupous and phlyctenular forms are characterized by the typical tissue changes implied in these adjectives. The treatment consists of isolation, roboration and local administration of thorough lavaging of the fornices and conjunctival sac, under local anesthesia when necessary, and instillation of disinfecting solutions. Do not use dionin for local anesthesia as cocain muriaticum 1 per cent solution, holocain muriaticum 2 per cent, or butyn 2 per cent is more efficient. Do not use inorganic or organic silver salt solutions, because argyro-

sis may develop and this is very unsightly. S. T. 37, metaphen and zinc sulfate are equally efficient antiseptic astringents and do not cause discoloration. Pingueculae should not be treated.

Pterygiums should be treated only if the triangular fold is too thick or the movements of the eyeball are limited or the head of the pterygium spreads over the pupil and interferes with vision. The treatment is a simple surgical procedure. The triangular fold must be freed and buried under a pocket of the bulbar conjunctiva and the head must be removed from the cornea followed by curettement of the site.

Foreign Bodies

Foreign bodies lodge frequently in the conjunctival sac, giving rise occasionally to the subjective symptom of ocular discomfort and the objective symptoms of lachrymation, photophobia, hyperemia and blepharospasm. The treatment consists of removal of the foreign body with the aid of an applicator or by lavage. Eversion of the lids will always be necessary so as to inspect the fornices. In many cases, multiple foreign bodies will be found.

Even in humans the diseases of the lachrymal glands rarely are met with. Aside from occasional malpositions, abscesses and neoplasms in veterinary medicine it will hardly be necessary to approach these glands. When removal is indicated, the operation can be done, without considering it mutilating, as the accessory tear-glands will continue to supply tears for the conjunctival sac.

Disturbances of the tear-conducting apparatus are due to malposition of the lids, congenital anomalies of the puncta, eversion of the canaliculi or obstructions of the nasolachrymal passages. The nasal opening of the latter in the inferior meatus is protected by a fold of the mucosa. This is an indication of nature that sondage and lavage should not be done from the nose toward the conjunctival sac, but in the reverse direction from above downward.

Obstruction of the passages may lead to stagnation and disintegration of tears and mucus. This can be treated by gradual dilation and lavage of the passages. If the infection causes a chronic dacryocystocele, resection of this must be done. Before operation, however, differential diagnosis must be done, to exclude dentigerous cysts, cysts of the ethmoidal sinus, prelachrymal cysts and encephaloceles.

Should an ocular disease, such as glaucoma or cataract, coexist with chronic dacryocystitis, this latter must be dealt with in the first place without delay as operative infection surely will set

in if the infected tear-passages are permitted to pour infective material into the postoperative eye.

When examining the cornea, in the first place it is necessary to keep in mind the anatomical and histological properties of the species or subspecies of animal, which the veterinarian observes. While the general plan of the corneal structure is followed in each species, the distribution of pigment, marginal opacities, the presence of blood-vessels and Bowman's membrane will vary.

It is well to examine the following properties in each case: size, shape, surface, transparency and sensitivity. Each corneal and endophthalmic disease affects these five properties and the observer soon arrives at a very useful schema, which will make diagnosis easy, treatment certain and improvement prompt.

Besides the oblique and focal illumination and examination under the lupe, it is good to have a 2 per cent solution of fluorescein muriaticum at hand, as this solution will stain a lively green all eroded or ulcerated areas, leaving unstained the healthy or cicatrized parts, which are covered with continuous epithelium. The sensitivity can be tested with the aid of a thin piece of sterile cotton. If in touching the cornea with this, the reflex of lid closure is prompt, we may judge whether total or partial loss or normal or increased sensibility is present.

The various congenital malformations will affect the size, shape and surface. The names of microcornea, macrocornea, keratoglobus and keratoconus well describe the conditions which supply the names. Congenital pigmentation and maculae may occur. Intra-uterine diseases may leave corneal maculae which are not of chromosomatic origin.

Keratitis

Keratitis superficialis is an inflammation, characterized by numerous small superficial infiltrations of the epithelium (Bowman) and rarely the superficial substantial layers. Several of these infiltrations break down, form shallow ulcers or erosions and then heal, leaving very fine corneal maculae. At the height of the affection, moderate ciliary injection is present. The anterior chamber and other parts of the anterior segment are not involved. The subjective symptoms are photophobia, lachrymation, visual disturbance and blepharospasm.

Keratitis ulcerosa is an inflammation, which is characterized by a large, more or less centrally situated infiltration, which involves the anterior three layers of the cornea. As the necrobiotic process progresses, the detritus will be thrown off and an ulcer results. The bottom of this may reach the deep layers of the

substantia propria and in certain cases even Descemet's membrane, causing herniation of the latter or even perforation of the whole cornea with or without prolapse of the iris and other complications. The ulcer progresses at one end, where its margin is undermined and it heals at the opposite end. There is a strong ciliary injection present and also hyperemic or inflammation of the iris with the usual posterior synechiae.

Descemetitis is always observed and hypopyon may be present. During this period of progression, distressing symptoms of pain, photophobia, etc., are present, especially when the complication of secondary glaucoma arises. This period is followed by that of regression, when all the edges and the bottom of the ulcer show no more tissue débris. The ciliary and anterior segmental reactions lessen and the subjective symptoms decrease in severity. This is followed by cicatrization; the discontinuity is filled from the bottom, irregular, substantial and interstitial tissues fill the deeper regions of the cleansed ulcer and finally the epithelium creeps across the indented, irregular surface of the newly formed tissue. After the eyeglobe becomes quiet, *i. e.*, the conjunctival and ciliary injections recede, a dense corneal opacity remains which is very unsightly and which of course interferes with the visual function. In the great number of still less favorable cases, several other permanent sequelae will be established, the most serious being the shrunken globe, following perforation of the ulcer, prolapse of the iris, fistula of the cornea, causing panophthalmia.

Keratitis parenchymatosa is a most important disease in man, caused by syphilis in 80 per cent, and tuberculosis in 15 per cent of the cases. The dog is immune to the former disease and the latter affects it rarely. Yet, keratitis parenchymatosa has been observed frequently. It would be of the utmost importance to find the causative agent or agents of this disease in veterinary medicine, as the discovery might help in reducing the number of cases of blindness in humans.

In keratitis parenchymatosa, the two anterior layers are not involved, except secondarily to a slight extent. The infiltration or infiltrations are deep in the substantia propria. Between the corneal lamellae, numerous leucocytes are present, causing swelling of the lamellae. Later blood-vessels penetrate from the limbic ciliary branches. After a period of progression with severe uveal symptoms, regression occurs, which leaves deep corneal maculae with facettes of the epithelial layers.

Keratitis e lagophthalmo is a corneal inflammation, which is secondary to lagophthalmos or dropping of the lower lid.

The local treatment of all forms of keratitis is identical. A mild antiseptic should be instilled once every hour. Atropin (¼ to 3 per cent solution) will be instilled also four times a day until mydriasis occurs. This paralyzes the oculomotor center and the resulting mydriasis decreases the congestion in the iris and prevents formation of central posterior synechiae. Paralysis of the ciliary muscle puts the eye at rest and so the pain is diminished. Frequent application of heat for 20 to 30 minutes at a time is warmly recommended. A light bandage should be applied and changed frequently so that the bacterial flora of the normal conjunctiva and lachrymal sac should not grow pathogenic and should not cause additional mixed infection.

If these simple rules are properly executed, hypopyon, descematocele, etc., will be prevented. If the ulcer progresses in spite of successful instillation, hospitalization is indicated. In the hospital, the ulcer may be cauterized with dilute iodin, silver nitrate or carbolic acid, but never with the actual cautery. For the evacuation of hypopyon, paracentesis of the anterior chamber is rarely successful. The transfixion operation of Saemisch is a desperate means, to be used only in extreme cases. If secondary glaucoma sets in, atropin should not be discontinued, but paracentesis may be necessary, in which case it is useful to keep the wound open for drainage for a period of five to seven days. The more serious complications must be dealt with surgically. In case of panophthalmia, evisceration and not enucleation must be done, as the latter might lead to meningitis.

The general condition of the animal should be kept at par. Underfed dogs must receive careful attention as to diet, and possible concurrent diseases must be treated.

Foreign bodies of the cornea can be located easily with the lupe and a focal light. The removal is best done with lavage of the cornea, or the end of an applicator, around which some cotton has been wound. Occasionally, the corneal spud must be used. When employing it, I recommend the use of a fixation forceps and the self-containing palpebral retractor, as coöperation can not be expected from the dog. After the removal, it is necessary to instill fluorescein in order to see whether discontinuity of the corneal surface exists. If so, I recommend the treatment outlined for keratitis in order to prevent complications.

Wounds of the cornea frequently heal under a protective aseptic dressing, although consecutive prolapse of the iris, uveitis and

endophthalmia may destroy the globe. To prevent these complications I recommend the surgical means of preparing a flap of the bulbar conjunctiva and pulling and suturing it above the cornea, which will be well protected under it. After the healing of the wound, the sutures may be separated and the flap will soon be retracted, leaving the cornea exposed as usual.

Neoplasms occur rarely on the cornea. The limbus is usually the site. Dermoids, epithelial cysts and epitheliomas have been reported. Even malignant growth may be treated conservatively by removing the growth with a keratome. I do not recommend application of radium on account of its effect on the dioptric media, retinal purple and retina.

The maculae resulting from diseases of the cornea may be cleared up with steady instillation of dionin solution (0.1 to 10 per cent), subconjunctival injection of hypotonic salt solution, and application of medical diathermy. Tattooing is very unsatisfactory, at least in humans.

On the sclera, besides rare congenital anomalies and traumatic lesions, we may observe occasionally a subacute inflammation. In humans, the etiology is rheumatism in most cases. In a second group, tuberculosis is responsible. Conjunctival and ciliary injections and a violet-hued protuberance characterize the lesion. The subjective symptoms are those of keratitis. The treatment follows that of keratitis.

K. C. V. C. Alumni Meet

At the meeting of the K. C. V. C. Alumni Association, held at the Waldorf-Astoria Hotel, August 14, 1934, Dr. B. S. Parkin, of Onderstepoort, Union of South Africa, gave a very interesting and instructive travelogue on South Africa. Officers for the ensuing year were elected as follows: President, Dr. C. C. Hisel, '16, Oklahoma City, Okla.; Vice-President, Dr. C. A. Nelson, '08, Brainerd, Minn.; Secretary-Treasurer and Editor, Dr. A. T. Kinsley, '04, Kansas City, Mo.

Cheyenne B. A. I. Men All Join

The U. S. B. A. I. workers of Cheyenne, Wyoming, are proud of their record of 100 per cent membership in the Twelfth International Veterinary Congress. The last application for membership, which made this hope a reality, was received in the office of the General Secretary, August 6.

FURTHER STUDIES OF VACCINATION DURING CALFHOOD TO PREVENT BANG'S DISEASE*

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INTRODUCTION

The results of many experiments dealing with vaccination as a means of combating Bang's disease in cattle have been reported during the last quarter of a century. Unless use was made of avirulent strains, vaccines commonly have been administered either to virgin heifers or to open cows, two months or longer before breeding. It has been a general belief that when cattle are vaccinated at this time the vaccinal infection is usually overcome in their bodies after a brief interval, a belief which appears to have been justified if *Brucella abortus* strains of low virulence are used in the preparation of the vaccines. It has been shown, however, that vaccines prepared from virulent strains frequently localize in the udders of vaccinated, unbred cattle, especially cows, and are eliminated in their milk.

A limited amount of experimental work only has been reported on the use of abortion vaccines in connection with calves. One of us[1] reported the results of an experiment in 1930, in which eleven animals vaccinated during calfhood were permitted to complete two periods of pregnancy, and then were subjected to *Br. abortus* ingestion exposure during each gestation period to test their immunity. Use was made of five unvaccinated, negative animals as controls during the first pregnancy and five others during the second pregnancy. The encouraging results which this experiment yielded seemed to justify further investigation, for they not only indicated that a distinct immunity, engendered during calfhood, persists when the animals become mature, but they also show that certain objectionable features that sometimes accompany the vaccination of heifers of near breeding age or cows can be eliminated by administering the vaccine when the animals are from four to eight months of age.

SOURCE OF EXPERIMENTAL STOCK

The vaccination experiment described in this paper was made with 33 cattle, of which 17 were vaccinated when between four and six months of age and 16 of about the same age were reserved for controls. Twenty-seven of the animals used in the experiment

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were born and reared at the Experiment Station and six were purchased when less than two weeks old from a dealer and permitted to nurse Station cows until they reached weaning age. A few of the calves produced at the Station were from *Br. abortus*-infected dams. However, 30 of the calves when placed in the experiment gave negative results to the agglutination test. The three remaining calves reacted in a titre of 1:25 only.

In order to guard against the possibility of drawing erroneous conclusions from the results of the experiment, as a consequence of confusing the immunity imparted by vaccination with any immunity that might possibly have been derived by the calves from infected dams, the principals and controls were so divided that each group contained an equal number of those from reacting cows.

Vaccines Used and Tests of Their Virulence

In an endeavor to obtain further data on the comparative immunizing values and objectionable features of different *Br. abortus* strains used for immunizing purposes, nine of the calves received, subcutaneously, 10 cc of vaccine prepared from *Br. abortus* (bovine) strain 19, a strain so low in virulence that guinea pigs only occasionally developed *Br. abortus* lesions when injected subcutaneously with 0.25 cc of vaccine prepared from it. The remaining eight principals received a corresponding dose of vaccine prepared from *Br. abortus* (bovine) strain 618. Vaccine prepared from this strain regularly produced *Br. abortus* lesions in guinea pigs when administered subcutaneously in doses of 0.25 cc. The vaccines were adjusted to a density ten times that of tube 1 of the McFarland nephelometer and 5 cc was injected subcutaneously on each side of the neck. The vaccinated calves were kept by themselves for two months after receiving the injections but principals and controls thereafter associated with each other.

There was a difference of a few months in the ages of the calves; consequently the principals were not all vaccinated on the same date. Eight calves were vaccinated on July 18, 1929; three on September 17, 1929, and six on April 8, 1930.

The vaccine injections commonly caused elevated temperatures of from two to four degrees in the calves for two or three days following the injections. Slight swellings developed at the sites of injection in a number of the animals, but no evidence of abscess formation was ever detected. Some of the vaccinated calves refused feed the day after they were injected but were soon eating normally again.

Effects of Vaccination on Agglutination Reactions

Blood samples were obtained from the principals many times at intervals of from two to five weeks following their vaccination and subjected to the abortion agglutination test in an endeavor to gain further data on the persistence of agglutinins occasioned by vaccination. Agglutination tests of the controls were made less frequently until after the breeding of the two groups was commenced.

Although the vaccination of the calves caused them to develop marked reactions to the agglutination test, reactions of high titre were not maintained for long periods, as commonly occurs when cattle acquire Bang's disease under natural conditions, and subsided even more rapidly and disappeared more regularly than those induced in older virgin heifers by vaccination. The agglutination titres appeared to reach their maximum in about 15 days after the administration of the vaccine, when the average titre was approximately 1:1,800. The titres then gradually decreased and at the end of four or five months results of agglutination tests usually were either negative or showed titres of 1:25 or 1:50 only. However, one animal that received the more virulent vaccine maintained a titre as high as 1:200 for seven months which soon afterward dropped to 1:50. When breeding of the heifers was commenced, in about 1½ years after the calves were vaccinated, eleven gave negative results to the agglutination test. The blood serum of two caused partial agglutination in a titre of 1:25; of three, complete agglutination in a titre of 1:25, and of one, complete agglutination in a titre of 1:50. It could thus reasonably be concluded that none of the heifers were carriers of *Br. abortus*.

Exposure of Cattle to Brucella Abortus

Breeding of the heifers was commenced in March, 1931, a bull negative to the abortion test having been used. Although many of the heifers bred promptly, it was not possible to get all of those in the vaccinated and control groups pregnant during a sufficiently brief period so that all could be given *Br. abortus* exposure at one time. Nine principals and eight controls were exposed on July 10, 1931; two principals and three controls, September 14, 1931; two principals and two controls, June 29, 1932, and one principal, November 5, 1932. None of the heifers were exposed until pregnancy could be recognized definitely by rectal examination.

All of the heifers were exposed *via* the conjunctiva and all except one to a single strain of *Br. abortus*, No. 1531. The one

exception received the same exposure as a control heifer used in another vaccine experiment which acquired the disease and aborted. Suspensions were prepared from 72-hour growths of strain 1531 that had a density twice that of tube 1 of the McFarland nephelometer. From three to four drops of the suspension were deposited on the conjunctiva of one eye. These suspensions when injected subcutaneously into guinea pigs in doses of 0.25 cc regularly caused pronounced *Br. abortus* lesions.

Agglutination tests that were made of the heifers 15 days after exposure revealed the presence of reactions of reasonably high titres in both controls and principals. The titres ranged from 1:50 to 1:500. The reactions acquired by the principals were about as marked in intensity as those acquired by the controls. When later agglutination tests were made, however, it was observed that gradually decreasing titres were given by the principals, while those of the controls commonly either remained stationary or showed an increase. Three months from the date of the exposures, agglutination results in the vaccinated animals were usually either negative or reacted in titres that were not above 1:50, whereas most of the controls after a like period gave pronounced reactions to the test.

Records were kept of the animals showing whether they produced vigorous or weak calves or aborted. Uterine material was obtained from each animal at time of calving or aborting, with which six guinea pigs were injected to determine whether *Br. abortus* was present in the uterus. Six guinea pigs also were inoculated with a 5-cc composite sample of colostrum from each animal to determine whether *Br. abortus* had invaded the udder. The aborted fetuses were cultured.

Results of First Pregnancies

Sixteen of the heifers vaccinated during calfhood produced vigorous calves and one a weak calf. The presence of *Br. abortus* was demonstrated in the uterus and colostrum of the dam which gave birth to a weak calf and in the colostrum of one of the heifers which produced vigorous calves, but its absence in the uterus of the latter animal was indicated by the results of guinea-pig inoculation. Efforts to prove the existence of *Br. abortus* in the uterine exudates and in the colostrum of the 15 other principals failed.

Of the 16 controls, seven aborted and three produced weak calves. *Br. abortus* was found to be present in the uterus and colostrum of eight of these ten heifers. In two instances inoculation results were not determined, for these two heifers aborted

unobserved. Of the six controls which produced vigorous calves, *Br. abortus* was proved to be present in the uterus and colostrum of one and in the colostrum of another. Failure was experienced in proving that *Br. abortus* was present either in the uterus or colostrum of the four remaining controls.

Table I shows the dates of vaccination, the *Br. abortus* strain used in preparing the vaccine which each of the principals received, the dates of breeding, dates of exposure, length of gestation periods, how the pregnancies terminated and the results of guinea-pig inoculations with uterine fluids and colostrum.

To gain further information as to the permanence of the immunity artificially induced during calfhood, ten of the vaccinated animals were bred again and subjected to such *Br. abortus* exposure during their second gestation periods as resulted from contact with several high-reacting, *Br. abortus*-infected cows, among which an occasional abortion occurred. While the existence of *Br. abortus* exposure was not actually demonstrated by subjecting negative pregnant cattle to the same conditions under which the vaccinated animals were kept, it seemed reasonable to regard the conditions as closely simulating those of a fairly heavily *Br. abortus*-infected herd.

Results of Second Pregnancies

Of the ten animals which were bred and permitted to complete their second gestations in the presumably contaminated environment, all produced vigorous calves. Guinea pigs which were injected with uterine material of each animal failed in all cases to acquire the disease. With the exception of two cows, colostrum from each animal at time of calving failed to transmit the disease to guinea pigs when injected intra-abdominally in 5-cc amounts. The presence of *Br. abortus* in the colostrum of two of the cows (1546 and 1640) was demonstrated, however. These animals were shown to be eliminating *Br. abortus* from their udders at the termination of their first gestation periods and thus apparently had continued to harbor the infection in their udders.

The identity of the animals that were carried through two gestations, their calving dates, and the results of guinea-pig inoculations obtained with uterine materials and colostrum are set forth in table II.

Discussion of Results

The results obtained from this experiment definitely indicated that a distinct immunity can be conferred to calves by vaccination which persists throughout their first gestation period. Some

TABLE I—*Immunization results in animals vaccinated during calfhood and later subjected to artificial Brucella abortus exposure through the conjunctiva.*

ANIMAL	DATE OF VACCINATION	BR. ABORTUS STRAIN	DATE OF BREEDING	DATE OF EXPOSURE	GESTATION PERIOD (DAYS)	OUTCOME OF PREGNANCY	RESULTS OF EXAMINATIONS FOR BR. ABORTUS	
							UTERUS	COLOSTRUM
1509		618	May 4, 1931		281	Vigorous calf	−	−
1510		19	Mar. 28, 1931		282	Vigorous calf	−	−
1511		618	May 3, 1931		279	Vigorous calf	−	−
1512		19	Mar. 23, 1931					
	July 18, 1929		May 4, 1931	July 10, 1931	287	Vigorous calf	−	−
1515		618	Apr. 6, 1931		280	Vigorous calf	−	−
1521		19	Apr. 23, 1931		283	Vigorous calf	−	−
1522		618	Mar. 30, 1931		279	Vigorous calf	−	−
1546		19	Apr. 3, 1931		287	Vigorous calf	−	±
1560		618	0	Jan. 18, 1932		Vigorous calf	−	−
1564	Sept. 17, 1929	19	Apr. 18, 1931	July 10, 1931	284	Vigorous calf	−	−
1568		618	June 4, 1931	Sept. 14, 1931	271	Vigorous calf	−	−
1631		19	0	June 29, 1932		Vigorous calf	−	−
1633		19	0	Aug. 30, 1932		Vigorous calf	−	−
1636		19	0	June 29, 1932		Vigorous calf	−	−
1638	Apr. 8, 1930	618	June 5, 1931	Sept. 14, 1931	271	Vigorous calf	−	−
1640		618	July 28, 1931					
			Aug. 20, 1931	Jan. 18, 1932	255	Weak calf	+	+
1641		19	0	Nov. 5, 1932		Vigorous calf	−	−

TABLE I—*Immunization results in animals vaccinated during calfhood and later subjected to artificial Brucella abortus exposure through the conjunctiva—Continued.*

ANIMAL	DATE OF VACCINATION	BR. ABORTUS STRAIN	DATE OF BREEDING	DATE OF EXPOSURE	GESTATION PERIOD (DAYS)	OUTCOME OF PREGNANCY	RESULTS OF EXAMINATIONS FOR BR. ABORTUS	
							UTERUS	COLOSTRUM
1513			Mar. 30, 1931	July 10, 1931	270	Vigorous calf	+	+
1514			Apr. 6, 1931	Sept. 14, 1931	235	Abortion	+	+
1524			Mar. 27, 1931	July 10, 1931	178	Abortion	+	+
1525			Mar. 26, 1931	July 10, 1931	255	Weak calf	+	+
1526			Apr. 3, 1931	July 10, 1931		Abortion	0	0*
1559			0	Aug. 30, 1932		Abortion	+	+
1561			Apr. 6, 1931	Sept. 14, 1931	268	Weak calf	+	+
1565			Mar. 18, 1931					
			Apr. 26, 1931	July 10, 1931	281	Vigorous calf	−	−
1566			Apr. 7, 1931					
	Controls		July 20, 1931	Jan. 18, 1932	263	Abortion	+	+
1567			Mar. 29, 1931	July 10, 1931	276	Vigorous calf	−	+
1632			0	June 29, 1932		Abortion	0	0*
1634			May 23, 1931	Sept. 14, 1931	215	Abortion	+	+
1635			Mar. 18, 1931	July 10, 1931	272	Vigorous calf	−	−
1647			0	Jan. 18, 1932		Weak calf	+	+
1650			0	June 29, 1932		Vigorous calf	−	−
1669			Apr. 17, 1931					
			May 3, 1931					
			May 9, 1931	July 10, 1931	282	Vigorous calf	−	−

Key: 0 = No record. + = Presence of *Br. abortus*. — = Absence of *Br. abortus*.
*Aborted unobserved.

evidence was obtained which indicates that the immunity thus conferred may be lasting.

Br. abortus strain 19, which was of low virulence, appeared to be as effective in inducing immunity to subsequent *Br. abortus* artificial exposure as strain 618, which regularly produced abortion disease lesions in guinea pigs. Since strains as low in virulence as No. 19 have given indication of being practically free from the objectionable feature of becoming implanted in the udders of unbred cattle when administered subcutaneously, the use of strains of low virulence appears to have a distinct advantage for vaccine preparation over those which retain much of their original virulence and which often become localized in the udders of open cows.

TABLE II—*Calving records during second pregnancies of animals vaccinated during calfhood when run with a Br. abortus-infected herd during their second gestation.*

ANIMAL	DATE GESTATION TERMINATED	OUTCOME OF PREGNANCY	RESULTS OF EXAMINATIONS FOR BR. ABORTUS	
			UTERUS	COLOSTRUM
1510	Feb. 6, 1933	Vigorous calf	—	—
1511	Nov. 3, 1933	Vigorous calf	—	—
1512	May 30, 1933	Vigorous calf	—	—
1515	Nov. 4, 1933	Vigorous calf	—	—
1522	Feb. 12, 1933	Vigorous calf	—	—
1546	June 7, 1933	Vigorous calf	—	+
1560	July 3, 1933	Vigorous calf	—	—
1564	May 26, 1933	Vigorous calf	—	—
1568	June 17, 1933	Vigorous calf	—	—
1640	June 1, 1933	Vigorous calf	—	+

Key: + = Presence of *Br. abortus*. — = Absence of *Br. abortus*.

The use of vaccine in connection with calves, rather than more mature, unbred cattle, seems to have several advantages. At this age, the danger of vaccinating pregnant animals by mistake is avoided. The agglutination reactions in calves caused by the vaccine injections appear to subside more promptly and disappear more regularly than the reactions induced in heifers of near breeding age or in open cows by vaccination; consequently the interpretation of the agglutination tests of herds when use of vaccine is confined to calves may not occasion serious confusion. The calfhood method of vaccination seems to have possibilities in herds which are maintained under range or semi-range conditions where breeding records are not maintained and where cattle are unaccustomed to being handled.

CONCLUSIONS

The information yielded by this experiment seems to justify the following conclusions:

The vaccination of calves from four to six months of age induces in them an immunity to Bang's disease that, in a high percentage of cases, protects against *Br. abortus* conjunctival exposure during their first pregnancy and that may be lasting.

Agglutination reactions of high titre are commonly caused by the vaccine injections, but the reactions rapidly subside in intensity and give indication of disappearing more regularly than the agglutination reactions induced in more mature, unbred cattle by vaccination.

A strain of *Br. abortus* of low virulence gives evidence of conferring as much immunity to calves against *Br. abortus* conjunctival exposure during their first pregnancy as a strain of pronounced virulence.

The immunization results derived from the experiment strongly suggest that the vaccination of calves furnishes a logical plan for dealing with Bang's disease in a class of herds from which the eradication of the malady by the prompt elimination or segregation of reactors is impractical and at the same time enables stock-owners to rear animals with increased resistance to the disease.

REFERENCES

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Dog Bar

Clear, sparkling water is the drink that is always demanded at the Dog Bar which Dr. Alan Bachrach (U.P.'28) has built in front of his hospital at 5909 N. Broad St., Philadelphia, Pa. The bar, which has a genuine brass rail, is made of black carrara glass and is illuminated at night. So popular is the bar with Philadelphia's dogdom that a local newspaper recently carried a picture of it, with Tiny, a great Dane, smacking his lips over the "best in the house."

The yearly losses of the American public by embezzlement are estimated at $150,000,000.

France, with less than one-third the population of the United States, has more than 5,000,000 farm proprietors.

LEGAL ASPECTS OF VETERINARY PRACTICE*

By JAMES W. HUGHES, *Elkton, Md.*

Wherever civilization has been established, sooner or later the customs and practices of the people have found expression in their laws. The law relating to the medical profession has had a gradual development, following quite closely the advance of medical science. Under the English Common Law, which is the basis of our system, the practice of medicine, in any of its branches, has never been considered *malum in se* or a nuisance *per se*. The same seems to have been true of the Roman law.

At common law the practice of medicine was open to all people who desired to practice it, subject to liability for damage for lack of skill, and to the right of the government to proceed by quo warranto to prevent incompetents from following the business.

As the knowledge of medical science advanced, and the confidence placed in the practitioner of medicine increased, the plan of keeping incompetent persons out of practice by bringing action against them after they had demonstrated their lack of skill at the expense of the public became increasingly unsatisfactory. In the year 1422, a statute was passed confining the practice of medicine to those who had studied the subject in a university or who were bachelors of science. This statute was very broad and its requirements not exacting. It was a start, however, in the direction of regulating the practice of a science and profession which vitally affected the well-being of the public. From that time to the present, numerous statutes have been passed, both in England and in this country, regulating the practice of medicine in its various branches. These statutes are generally construed to be applicable only to those acts which are fairly covered by their terms. For instance, it has been held that the business of massage does not violate a medical practice act.

In this country the specific requirements for practice are governed by each state for its own territory. This is a result of our dual sovereignty theory of government. Objections to this are more in the nature of questions of convenience than of any substantial difference in the laws.

Statutes regulating the practice of human medicine were enacted before those regulating veterinary medicine and dentistry but the same principles and rules are applied to all branches of medical science as far as the law is concerned.

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There are two theories advanced for the support of statutes regulating medical practice. One is that persons having qualified themselves by education and experience for such practice are entitled to a protection which would amount to a monopoly in their field of activity. The other theory, and the one generally considered to be founded in better reasoning, is that medical practice in all of its branches involves a confidential relationship between the practitioner and his patient or client, as the case may be, and that the public is entitled to be protected from those who are not qualified. Numerous variations of this theory are to be found in texts and cases, but they all center upon the protection of public health. It is upon this latter theory that practice acts are usually sustained as coming within the police power of the state.

The requirements of a statute regulating the practice of any particular branch of medical science cannot be arbitrary but must bear some reasonable relation to the practice of the profession which it purports to regulate. Thus, to require that one must be a member of a certain race, or have a degree in mechanical engineering, in order to be licensed to practice veterinary medicine, would be void as having no reasonable relation to such a profession. But to require a reasonable general education and the completion of a thorough special course of study, along the lines usually considered as being embraced in veterinary science, is proper and valid. Likewise, the regulations imposed upon the practitioner after he is licensed must not work undue hardship and must bear some reasonable relation to the object to be accomplished, namely, the protection of health.

In the case of the veterinary practitioner, his contractual and confidential relationships are with the owners of his patients, but the regulation of this practice is universally held to be a proper exercise of the police power in the interests of protection of health. All legal questions pertaining to veterinary practice are measured by exactly the same standards as apply to similar questions in connection with human medicine and dentistry.

A person who meets the qualifications required by the state has a right to practice his profession there. This right is a valuable property right but one which is held subject to such reasonable requirements and restrictions as may be imposed by the state.

When a person, duly qualified, enters into the practice of veterinary medicine, he offers his services to the public. He is presumed to have that degree of learning and skill which is ordinarily possessed and practiced by his contemporaries in the profession. If he does not have this degree of skill, or, if having it,

he fails in any given case to use it, he is guilty of malpractice or negligence and is liable for such damage as is traceable to his error or neglect. Whether the proper degree of care and skill have been exercised must be determined by the circumstances of each case where the question arises. It is the duty of the practitioner to do everything that is reasonably possible for the protection of his patient. For example, if the patient be a horse, suffering from a serious wound, however skillful the treatment of the wound, it probably would be negligence to fail to use or recommend the use of tetanus antitoxin. Except where one holds himself out to the public as a specialist in some particular line, no special skill, above that which is common to the profession, is required of him, and when he has exercised this he is not liable for any bad results which may follow the treatment.

Suits against practitioners on the ground of malpractice or negligence are quite frequent in some places. Hence the necessity of the practitioner being well informed as to the latest approved methods of treatment and of using care in all cases. The degree of skill required of the individual is that which is set by the profession as a whole. The man who is in close touch with the developments in his profession and is known by his fellow veterinarians to be skillful, if he uses reasonable diligence, is in little danger from unjust claims which occasionally are made. To be consistently careful and scientific in one's routine work discourages the bringing of these unfounded claims, and a close professional contact with other veterinarians is very helpful in defeating them when they are made.

When a veterinarian is employed, in the absence of some special agreement, he is expected to judge not only as to the kind of treatment but as to its extent as well, and the person who engages his services impliedly agrees to pay a reasonable fee for such service. This liability to pay for services rendered is in no way dependent upon the results obtained. It is not a lien upon the patient but is an ordinary debt against the party who contracted for the services. The question of enforcing payment is one of policy rather than of law. The right exists.

This discussion does not purport even to touch all the high points of the subject but one other phase should be briefly mentioned. Veterinarians are frequently called to testify in courts in the capacity of expert witnesses. The difference between an expert and an ordinary witness is that the ordinary witness is permitted to testify only as to facts of which he is supposed to have personal knowledge, and the interpretation of those facts is

left to the jury. The expert witness, as concerns matters upon which he qualifies as an expert, may testify not only as to facts of which he has knowledge, but also may express his opinion as to the cause or probable results of these facts. Further, there may be stated to him a set of facts of which he has no personal knowledge and he may express his opinion as to the cause or the result of these facts, assuming them to be true. It is apparent that under these circumstances one may easily be led into giving false impression. While this type of testimony given by veterinarians does not as a rule receive so extensive publicity as is frequently given the testimony of physicians, still, for the protection of his own reputation and that of the profession, the veterinarian who is called upon to give expert testimony should be thoroughly familiar with the subject upon which he is to testify and carefully guard against anything but an unbiased opinion.

Speaking generally, veterinary law is made by the veterinary profession. If veterinarians set and maintain a high standard, the law will require all who would enter the profession to conform to that standard. It is for us, then, to put our house in order and diligently see to it that those who bear the title "veterinarian" bear it with honor.

PERSONALS

Dr. D. R. Edwards (Gr. Rap. '14), of Fox Lake, Wis., has removed to Markesan, Wis.

Dr. William T. Bollmeier (O. S. U. '18), of East Saint Louis, Ill., has been named commander of the East Saint Louis 124th Field Artillery Post No. 63, American Legion.

Dr. Robert L. Hummer (U. P. '34) recently joined the staff of the Knoxville Veterinary Hospital, Knoxville, Tenn., filling the vacancy caused by the death of Dr. G. A. Metcalf.

Dr. Edward C. Jesperson (McK. '16), who has been veterinarian for the Wern and Keystone certified dairy farms, Waukesha, Wis., for the past six years, has opened an office at Fort Atkinson, Wis.

Dr. S. C. Lilly (O. S. U. '16), formerly of Dayton, Ohio, has established his offices in a roomy residence at London, Ohio. The remodeled residence also will supply splendid hospital facilities for Dr. Lilly.

Dr. Michael D. Ducey (Ont. '16), who has been connected with the Detroit (Mich.) Board of Health for the past four years, has decided to return to practice. He is planning to open a hospital for small animals at Midland, Mich.

Dr. E. B. Topmiller (McK. '07) has opened a hospital at Columbia, Tenn. Mercy Hospital, as the new institution is called, has quarantine rooms for animals and an especially built room for confining dogs that have been exposed to rabies.

Dr. Leonard J. Goss (O. S. U. '34), of Columbus, Ohio, has accepted an assistantship in research at the New York State Veterinary College, Cornell University, and will pursue studies leading to a Master's degree. His graduate work will deal with the diseases of poultry.

BRACHIAL ANEURYSM IN A HEREFORD STEER*

By J. F. BULLARD, *LaFayette, Indiana*
Purdue University Agricultural Experiment Station

This case of aneurysm occurred in a Hereford steer weighing approximately 700 pounds.

The history revealed that this steer was one of 30 animals that had shipping fever about six months previous to its death. A short time after it had recovered from this disease, it was placed in the feed-lot. After being in the feed-lot for several months, it developed an opacity of the cornea of the right eye. The steer apparently was normal, with the exception of the eye lesions, on the morning it died. The herdsman was present and said that the steer dropped very suddenly and kicked only a few times.

The autopsy was performed within an hour after death. With the exception of the corneal opacity, the only other abnormality seen in the external examination was an anemic condition of all visible mucous membranes.

Upon opening the abdominal cavity, all organs appeared pale and anemic. Very little blood exuded from the cut surfaces of the various parenchymatous organs. The kidneys, however, did show some gross pathology. They were slightly enlarged, friable, edematous and anemic. The capsule peeled easily and there was a slight bulging of the cut surface. The renal papillae were very reddish brown and hemorrhagic and stood out in bold contrast to the paleness of the rest of the organ.

The most striking pathological condition was seen when the left thoracic cavity was opened. It was filled completely with clotted blood, the pressure being so great that large impressions were made in the clot by the ribs. The clot was removed carefully and the cavity washed until the pericardial sac and collapsed lung were seen. A rather organized clotted mass was found just anterior and slightly ventral to the heart, into which the left brachial artery entered. This mass was taken out with the heart

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and adjacent arteries. After thoroughly cleaning up the tissues it was found that an aneurysm two inches long and one inch in diameter was present in the left brachial artery. From a closer examination one could determine that a rather old clot had formed around the aneurysm and that a recent rupture had occurred which accounted for the extreme unilateral hemothorax.

Microscopic examinations were made of the kidneys and the aneurysm wall. The latter showed almost a complete destruction of the intima, with infiltration by polymorphs, and extensive hemorrhage into the remainder of the arterial wall. Considerable necrosis also was present.

The kidneys revealed extensive degenerative changes and simple necrosis of the tubular epithelium. The glomerular tufts also were distended and edematous. Some interstitial nephritis also was noted. The lumina of many tubules showed distention which apparently was caused by occlusions. The pyramids showed extensive purulent changes and necrosis, together with considerable hemorrhage, to the extent that the normal architecture could not

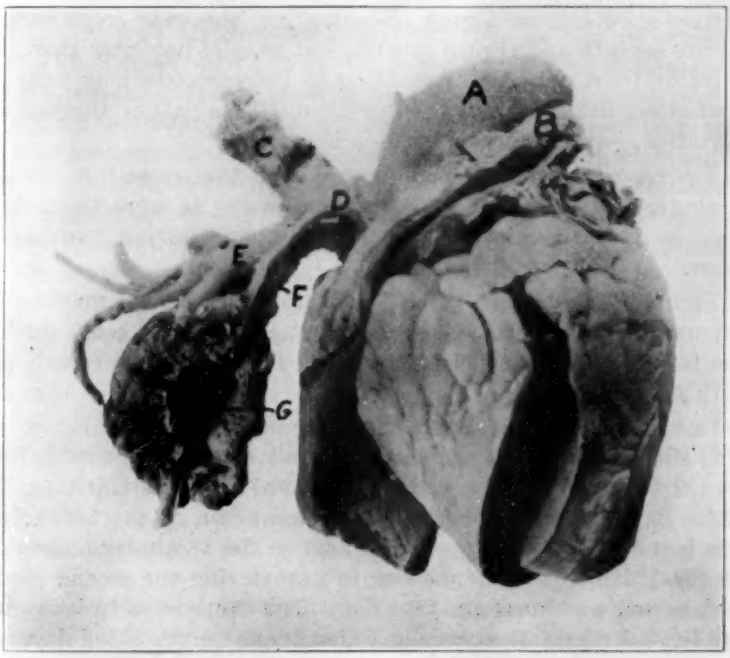

FIG. 1. Heart and vessels, with brachial aneurysm, in a steer. A, aorta; B, pulmonary artery; C, anterior vena cava; D, brachiocephalic trunk; E, right brachial artery with its terminal branches; F, left brachial artery; G, aneurysm.

be determined. A general infiltration by polymorphs was seen in all parts of the sections examined.

Figure 1 shows the gross pathology seen on autopsy.

THE OCCURRENCE OF ESTRUM IN CATTLE DURING PREGNANCY*

By J. F. BULLARD, *LaFayette, Indiana*
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The cessation of the estrual cycle following coitus is considered a good criterion of conception in cattle with normal breeding records. The continuation of this cycle after copulation usually indicates that conception has not taken place. However, this condition in cattle having a poor breeding history carries less weight than in animals that are normal.

Cattle may come into estrum during gestation. This statement is supported by observations of various authors. Williams[1] states that, in his experience, between one and two per cent of cows and heifers show estrum during gestation, and this may occur as late as the seventh and eighth months, but usually not later than the third or fourth month. According to Dukes,[2] cows may come in heat at regular or irregular intervals during a part or throughout gestation, but the estrual cycle is absent.

The report given here includes ten cows that came into estrum during gestation. Nine of them came in one or more times during one gestation, while one showed estrum during two gestations.

Five (45.45 per cent) of the eleven cases recorded manifested estrum during the first pregnancy, three (27.27 per cent) during the third and one each (9.09 per cent) for the second, fourth and fifth pregnancies.

In each of five heifers showing estrum during the first gestation the estrual periods appeared as follows: for the first heifer, on the 65th day; the second, on the 83rd day; the third, on the 124th day; the fourth, on the 133rd and again on the 230th day. The last one of this group was in heat on the 138th day and again on the 235th day. The one cow in heat during the second gestation period was in on the 31st day. The three cows in heat during the third gestation were as follows: one on the 253rd day, one on the 12th day, and the last one on the 153rd day.

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The one case recorded during the fourth gestation period manifested heat on the 24th, 82nd, 98th and 105th days after service. This same cow showed estrum on the 139th and 169th days of the fifth gestation period. Several of these cows were bred during the gestation period. Five were given one service, one two services, and one four services. This last cow gave birth to a premature calf and retained the placenta. She had a history of being a "poor breeder."

Complete breeding records were not available in all of these cases. From the information secured one would be justified in believing that in a few instances some of the cows had been bred several times before conception occurred. The first breeding dates recorded by the herdsman were the only ones that could be secured and they were the dates when conception apparently occurred, as these cows freshened within two or three days of the dates when due, as calculated from the herdsman's records. If more complete breeding records had been available, and examinations for pregnancy made, the extra breedings would have been avoided in most of the cases.

A routine examination for pregnancy in the animals that are bred is the only accurate method of determining the presence of a fetus. The advisability of doing this in heifers and cows is quite apparent. An examination of the majority of the cases included in this report would have enabled the examiner to determine pregnancy, and as a result, useless services and possible injury to the animal would have been avoided. A check also could have been made of any pathological condition involving the organs of generation, and treatment given, or the owner advised as to the disposition of the animal.

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BRUCELLA ABORTUS IN THE SEROUS EFFUSION OF THE HIP-JOINT OF A COW*

By A. L. DELEZ, *LaFayette, Indiana*
Purdue University Agricultural Experiment Station

Brucella abortus organisms were demonstrated in the carpal hygromata of two cows by Boyd, Delez and Fitch.[1] Van der Hoeden[2] and Magnusson[3] confirmed these findings. The former also demonstrated the presence of antibodies—both agglutinins

*Received for publication, August 16, 1934.

and complement-fixing—in this fluid. Boyd, Delez and Fitch failed to obtain the organisms from the stifle-joints of two cows affected with acute gonitis.

The writer has had an opportunity to examine the fluid from a swelling of the hip-joint of a Jersey cow that had aborted three months previously. The animal was eight years old and had aborted twice; the first abortion occurred 14 months previous to the second. Since the last abortion, this animal has been bred to several bulls but has failed to conceive. Swellings of the left knee, left hip and right stifle-joint were observed. Lameness developed in the left hind limb.

Guinea pigs injected with the hip-joint fluid developed lesions of *Brucella abortus* infection and typical organisms were isolated from the spleen and liver. The original cultures required a 10 per cent carbon dioxid atmosphere for their growth. On liver-agar plates containing dyes according to the method of Huddleson,[4] the organisms grouped themselves as a bovine strain of Brucella. Growth occurred on plates containing gentian violet, basic fuchsin and pyronin but not in those containing thionin.

Table I shows the agglutinin titres of the blood serum and also the serous effusion from this case. A prezone reaction was observed in the joint fluid up to the 1:100 dilution.

TABLE I—*Agglutination titres of blood serum and hip-joint effusion.*

	AMOUNTS OF FLUID (CC)								
	.04	.02	.01	.004	.002	.001	.0004	.0002	.0001
Blood serum	+	+	+	+	+	+	±	±	—
Hip joint effusion	+	±	±	+	+	+	±	±	—

+ = Complete agglutination. ± = Partial agglutination. — = No agglutination.

ACKNOWLEDGMENT

The writer wishes to express an appreciation to Dr. L. O. Fish, of the Indiana Live Stock Sanitary Board, for kindly submitting the specimen of hip-joint fluid and also for furnishing the history of the animal upon which this report is based.

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Regular Army

Major Harry J. Juzek is relieved from duty at Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa, effective at such time as will enable him to proceed to New York, N. Y., and sail on or about September 22, 1934, via Government transportation, for the Hawaiian Department. Upon arrival at Honolulu, Major Juzek will report to the commanding general for assignment to duty with the Veterinary Corps. The name of Major Juzek is removed from the detached officers' list, effective upon relief from his present duties.

Orders relieving Captain Herbert M. Cox, from duty at Plattsburg Barracks, N. Y. and assigning him to the Panama Canal Department for duty, are revoked.

Orders assigning Major James L. Barringer to duty at Plattsburg Barracks, N. Y., upon completion of his present tour of foreign service, are amended so as to assign Major Barringer to duty at Fort Ethan Allen, Vermont, instead.

Major Arthur D. Martin is relieved from duty at Fort Ethan Allen, Vt., at such time as will enable him to proceed to New York, N. Y., and sail on transport scheduled to leave that port on or about October 4, 1934, for the Panama Canal Department.

Lt. Colonel Alfred L. Mason is assigned to the Army Medical Center, Washington, D. C., effective upon completion of his present tour of foreign service, and, in accordance with orders to be issued by the commanding general Panama Canal Department, will join that station and report to the commanding general for duty for the purpose of pursuing a course of instruction at the Army Veterinary School.

Major Wm. R. Wolfe is relieved from further assignment and duty at Fort Francis E. Warren, Wyo., will proceed to Fort Logan, Colo., and report to the commanding officer for duty, and in addition will act as acting veterinarian Fitzsimons General Hospital, Denver, Colo.

The appointment and assignment of the following-named second lieutenants, Veterinary Corps Reserve, as second lieutenants in the Veterinary Corps, Regular Army, with rank from July 1, 1934, is announced:

William Edwin Jennings, Fort Leavenworth, Kan.

Curtis William Betzold, Quartermaster Depot, Chicago, Ill.

Major Nathan M. Neate is assigned to duty at the San Francisco port of embarkation, Fort Mason, Calif., effective upon completion of his present tour of foreign service in the Hawaiian Department.

Colonel Walter Fraser, Presidio of San Francisco, Calif., has been directed to proceed to his home and await retirement.

The promotion of 2nd Lieut. Geo. T. Price to the grade of 1st lieutenant to rank from July 16, 1934, is announced.

Major Clifford E. Pickering is relieved from further assignment and duty at March Field, Calif., and will proceed to Fort MacArthur, Calif., for duty.

Orders assigning 1st Lieut. John L. Owens to duty at Fort Riley, Kan., are revoked. Lt. Owens is assigned to duty as a student at the Quartermaster Corps Subsistence School, Chicago, Ill., effective upon completion of his present tour of foreign service in the Panama Canal Department.

Major Everett C. Conant is relieved from further assignment and duty at the purchasing and breeding headquarters, Lexington, Ky., and from additional duty at the University of Kentucky, effective upon completion of his present leave of absence, will then proceed to Fort Reno, Okla., and report to the commanding officer Reno headquarters depot for duty.

Veterinary Reserve Corps

New Acceptances

Allen, John Kenneth.....2nd Lt..1201 Orchard Drive, Ames, Iowa.
Blake, Gordan Wellington....2nd Lt..1217 West 3rd St., Waterloo, Ia.
Collins, William Francis.....2nd Lt..Route 1, West Bend, Iowa.
Hendricks, Stanley Linae.....2nd Lt..Watertown, Minn.
Parker, Robert Milton.....2nd Lt..R. F. D. 1, Alta, Iowa.
Stephan, Carl Frederick.....2nd Lt..543 14th St., S. E., Mason City, Iowa.
Thompson, Edward Everett...2nd Lt..Route 2, Lyle, Minn.
Dorrough, Bill .....2nd Lt..Route 1, Odenville, Ala.
Ginn, William .....2nd Lt..Varnville, S. C.
McGee, George Mitchell.....2nd Lt..Baker Hill, Ala.
Wann, Russell S.....2nd Lt..Silverwood, Ind.
Gomez, Frank Donald.....2nd Lt..c/o Univ. of Calif., Berkeley, Calif.
Brandon, Glen Cecil.....2nd Lt..509 So. Main St., Piqua, Ohio.
Butz, Harrison William Jr....2nd Lt..5133 Broerman Ave., St. Bernard, Ohio.
Day, Robert Wayne.....2nd Lt..2121 Sunbury Road, Columbus, Ohio.
Dinkel, John Harold.....2nd Lt..R. R. 4, Bucyrus, Ohio.
Ferguson, Lloyd C.....2nd Lt..R. R. 1, Kirklin, Ind.
Galovich, John Jr.....2nd Lt..Route 4, Ashtabula, Ohio.
Goss, Leonard Joyce.....2nd Lt..5441 Hard Road, Columbus, Ohio.
Hartman, Ralph Porter.....2nd Lt..East Liberty, Ohio.
Johnson, Earl Forest.....2nd Lt..Prospect, Ohio.
Knisely, Burnell Edison.....2nd Lt..R. R. 1, Crestline, Ohio.
Knudson, Robert Laurence...2nd Lt..25 West Lane Ave., Columbus, Ohio.
Micuda, John .....2nd Lt..R. F. D. 2, Amherst, Ohio.
Phipps, Edward Chauncey....2nd Lt..South Walnut St., Cynthiana, Ky.
Sirilo, Andrew Jesse.....2nd Lt..11012 Penfield Ave., Garfield Heights, Cleveland, Ohio.
Smith, Kenneth William.....2nd Lt..R. R. 3, Bellefontaine, Ohio.
Bancroft, Franklin Edwin...2nd Lt..16 Graves St., Gouverneur, N. Y.
Barnes, Lloyd Delos.....2nd Lt..819 89th St., Niagara Falls, N. Y.
Bauer, Walter Oliver.....2nd Lt..58 Regent St., Buffalo, N. Y.
Green, Charles Frederick, Jr..2nd Lt..120 Dearborn Pl., Syracuse, N. Y.
Hallett, Charles Sherwood....2nd Lt..112 E. Main St., Riverhead, N. Y.
Hughes, Trevor Hugh.....2nd Lt..R. F. D. 2, Box 9, Utica, N. Y.
Hunsberger, Ray Swartley....2nd Lt..19 Sterling St., Middletown, N. Y.
Jones, Erwin Haugh.....2nd Lt..184 Glasgow St., Clyde, N. Y.
Laughlin, Bernard James.....2nd Lt..Akron, N. Y.
Lormore, Robert Edward.....2nd Lt..Sidney Center, N. Y.
McCarthy, John Francis.....2nd Lt..34 Railway Ave., Cortland, N. Y.

Merenda, Joseph John.....2nd Lt..Glen Head, Long Island, N. Y.
Perella, Dorwin Herman.....2nd Lt..97 West St., Johnson City, N. Y.
Richardson, Frederick Henry.2nd Lt..R. 4, Box 19, Ogdensburg, N. Y.
Rogers, Arthur Bartlett.....2nd Lt..West Laurens, N. Y.
Steffen, Rudolph Julius.....2nd Lt..311 Broad St., Horseheads, N. Y.
Witter, Willis Francis.....2nd Lt..Brookfield, N. Y.
Bergsten, Marcus Lorenzo....2nd Lt..Cleburne, Kan.
Chleboun, Paul Edward.....2nd Lt..Stanton, Neb.
Cox, Forrest Oliver.....2nd Lt..512 N. 16th St., Manhattan, Kan.
Dicke, Walter Edward.....2nd Lt..R. F. D. 2, Louisburg, Kan.
Hensley, John Herbert.....2nd Lt..Box 775, Route 1, Vallejo, Calif.
Kester, Howard Luther.....2nd Lt..Cambridge, Neb.
McDonald, Alvin Rutti.....2nd Lt..Bremen, Kan.
Michael, Lloyd Jake.....2nd Lt..Rural Route 2, Eudora, Kan.
Miller, Clement Lambert.....2nd Lt..Route 3, Clarkson, Neb.
Mydland, Haldor Thomas.....2nd Lt..132 West 14th St., Horton, Kan.
Nichols, James Bernhard.....2nd Lt..Superior, Neb.
Rippetoe, Culver Willis.....2nd Lt..R. F. D. 2, Meriden, Kan.
Schulz, Carl William.....2nd Lt..1412 N. Liberty St., Independence, Mo.
Sibert, Herbert Franklin.....2nd Lt..Nelson Neb.
Thiele, Arthur Reinhardt....2nd Lt..Bremen, Kan.
Barnes, Carl George.....2nd Lt..R. F. D. 1, Laceyville, Pa.
Calldemeier, Huston Adrian..2nd Lt..409 S. Jackson St., Louisville, Ky.
Miller, Malcolm Eugene.....2nd Lt..R. F. D. 8, Towanda, Pa.

Promotions

To

Picht, Clyde Wilton.....Capt....1307 S. 13th East St., Salt Lake City, Utah.

COMMENCEMENT

UNIVERSITÉ DE MONTRÉAL

The following senior students in the École de Médecine Vétérinaire de la Province de Québec, Université de Montréal, received the degree, Doctor of Veterinary Medicine, on May 16, 1934:

Gabriel Bonin
Samuel Bouchard
Edouard Brassard
Pierre Gaudet
Charles-Auguste Gauthier
Rosaire Gauthier
Hubert Goyer
Lucien Lupien
Nosario Rajotte
René Séguin

BUREAU TRANSFERS

Dr. A. J. Burley (Corn. '05) from Valentine, Neb., to Buffalo, N. Y., on tuberculosis eradication.

Dr. Albert R. Miller (Iowa '24) from South Kortright, N. J., to Jersey City, N. J., on meat inspection.

Dr. H. R. Collins (K. C. V. C. '06) from El Paso, Tex., to Phoenix, Ariz., in charge of meat and field inspection.

NEW YORK STATE VETERINARY MEDICAL SOCIETY

The forty-fourth annual meeting of the New York State Veterinary Medical Society was held at Rochester, June 28-29, 1934, and was one of the best attended and most instructive meetings held in many years. More than 200 were in attendance.

Hon. Charles Stanton, mayor of Rochester, welcomed the Society to the city and Dr. R. S. MacKellar, of New York City, responded. In his response, Dr. MacKellar quoted extracts from a local newspaper, the *Morning Herald*, of January 16, 1890, printed the day following the first meeting of the Society in Rochester, 44 years ago. Dr. Ben Howes, of Carlton, a charter member who attended the 1890 meeting, was introduced and given an enthusiastic welcome, which he acknowledged with a few well-chosen remarks.

President H. J. Milks gave an inspiring address. He referred to the changes in veterinary science since the beginning of the century and to the opportunities that now lie before the profession. He pointed out the importance of united effort by all branches as important in bringing about more efficient service. Dr. Ward Giltner, dean of the Veterinary Division of Michigan State College, gave an interesting address, with special reference to problems of the profession associated with tuberculosis, Bang's disease and mastitis.

In the afternoon, a large-animal and poultry clinic was held at the County Farm outside the city. This session was devoted to demonstrations and operations by various specialists, and included physical examination for mastitis, agglutination tests, poultry vaccination, acetonemia, surgical operations and microscopical examination of specimens for parasites.

At the evening session following the annual dinner, Mr. W. D. Tiedeman, of the State Department of Health, addressed the Society on "The Sanitary Code with Particular Relation to the Veterinarian." This was followed by the very important report of the Committee on Mastitis, presented by the Chairman, Dr. D.

H. Udall, of New York State Veterinary College. This Committee, authorized at the 1933 meeting of the Society, had covered the subject thoroughly. Many demonstrations and conferences had been held and an outline of procedure to govern physical examination of dairy cattle had been prepared, entitled, "Manual of Instruction for Veterinarians Engaged in Making Physical Examinations of Dairy Herds." After considerable discussion, this report was unanimously adopted as the standard to be recommended to the State and New York City Departments of Health and the State Department of Agriculture and Markets. The Commissioner of Agriculture and Markets, Hon. Charles H. Baldwin, was not able to attend the meeting, because of official duties.

Through the courtesy of Dr. C. M. Carpenter, formerly on the staff of the New York State Veterinary College, Cornell University, and now Associate Professor of Bacteriology at the School of Medicine and Dentistry, University of Rochester, the entire second day was spent at the University and the Strong Memorial Hospital, where unusual facilities were available. Dr. Nathaniel W. Faxon, director of the Hospital, welcomed the guests, and the following program was presented:

"The Psittacosis Problem in the United States," by Dr. George P. Berry, Professor of Bacteriology.

"Some Opportunities for Nutritional Research in Veterinary Medicine," by Dr. John R. Murlin, Professor of Vital Economics.

"Immunity to Animal Parasites with Special Reference to *Trichinella Spiralis*," by Dr. Oliver R. McCoy, Assistant Professor of Parasitology.

"A Test for the Detection of Unpasteurized or Improperly Pasteurized Milk," a demonstration given by Dr. Harold W. Leahy, Sanitary Bacteriologist and Chemist.

"A Comparison of Bacteria Counts on Milks from Normal Cows and Those with *Brucella Abortus*—Infected Udders," by Dr. C. M. Carpenter.

Through the courtesy of the Eastman Kodak Company, some very unusual moving pictures were shown, which included a human case of rabies, acute appendicitis, Kodacolor in medicine and surgery, and enucleation of the lens affected with cataract.

During the afternoon, several autopsies were performed as follows:

1. A case of duodenal ulcer which resulted fatally because of hemorrhage.
2. A case of tuberculosis complicated with purpura which resulted in a cerebral accident.
3. A case of coronary occlusion.
4. A case of cerebral accident with complication of the ventricles.

Among the demonstrations were:

Differentiation of pasteurized milk from raw milk.
Production of artificially induced fever in calves with *Brucella abortus* and tuberculous arthritis.
Experiment dogs used in medical research.
Pregnancy tests, by Dr. Arthur C. Elden.

At the business session which followed, 15 applicants were admitted to membership, two resignations were received and the deaths of two members reported. Binghamton was selected as the meeting-place for 1935. Much of the success of the meeting was due to the untiring efforts of Dr. F. L. Stein, Local Chairman, and his Committee, and Dr. C. M. Carpenter and his associates at the Strong Memorial Hospital.

Officers elected for the coming year are: President, Dr. A. E. Merry, Syracuse; vice-president, Dr. H. V. Baker, Hamburg; member of the Executive Board, Dr. F. F. Fehr, Buffalo (re-elected).

J. G. WILLS, *Secretary.*

MAINE VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Maine Veterinary Medical Association was held at the Gateway Inn, Portland, July 11, 1934, with 20 members in attendance. A shore dinner was held prior to the business meeting, which was also attended by the ladies. The guest speaker was Dr. Harry W. Jakeman, of Boston, Mass., who spoke very interestingly on the subject of "Hydrochloric Acid Therapy."

R. E. LIBBY, *Secretary.*

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY

The fiftieth semi-annual meeting of the Veterinary Medical Association of New Jersey was held at the Monterey Hotel, Asbury Park, July 12-13, 1934, with the best attendance for a summer meeting in several years. In addition to the 64 members registered, 27 visitors also were present to enjoy the program.

Three subjects were discussed on the afternoon of the first day: "Bovine Practice," by Dr. John F. DeVine, of Goshen, N. Y.; "The Revival of the Horse," by Mr. Regis E. Lefebure, of Tenafly, N. J.; "Small-Animal Practice," by Dr. John F. Planz, of Akron, Ohio. The Association dinner was held in the evening, and was informal and enjoyable, with no speechmaking. Many

of the wives and daughters of those in attendance were present at the dinner.

At the morning program the next day, Dr. E. F. Schroeder, of Angell Memorial Hospital, Boston, presented a paper on "The Handling of Fractures in Canine Practice." Dr. J. N. Frost, of the New York State Veterinary College, Cornell University, spoke on "Equine Practice and Surgery." Dr. A. Eichhorn, chairman of the Organizing Committee for the Twelfth International Veterinary Congress, was present and gave an inspiring résumé of the plans for the big meeting in New York. In this, he was seconded by Dr. E. R. Cushing, resident secretary of the A. V. M. A. for New Jersey.

In the afternoon, Dr. E. F. Schroeder, assisted by Drs. Planz and J. A. S. Millar, presented a complete demonstration of the handling of fractures in dogs in which he employed various modifications of the so-called Thomas splint. In addition, Dr. Schroeder showed a large number of lantern-slides illustrating reports of fracture cases, showing roentgen-ray "befores" and "afters."

All of the talks and demonstrations presented at the meetings were intensely interesting and practical. The Local Committee functioned under the chairmanship of Dr. H. C. Millar, of Asbury Park, other members being Drs. J. A. S. Millar, of Deal; Harry Ticehurst, of Shrewsbury; Peter F. Runyon, of Freehold; V. B. Height, of Asbury Park, and Andrew G. Vogt, of Allenhurst.

Invitations for the annual meeting in January were received from Dr. John T. McGrann, of Trenton, and Dr. Benjamin W. Suydam, Jr., of New Brunswick. The decision was left to the Executive Committee. Ten new members were elected at the meeting.

J. G. HARDENBERGH, *Secretary.*

KENTUCKY VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Kentucky Veterinary Medical Association was held at the Brown Hotel, Louisville, July 11-12, 1934, with a good attendance.

The meeting was called to order by the President, Dr. J. R. Stifler, of Lebanon. The first session was devoted chiefly to a round-table discussion of the control and eradication of Bang's disease, and federal regulations regarding interstate and international shipment of live stock. Dr. D. E. Westmorland, State Veterinarian, led the discussion on Bang's disease, and Dr.

W. F. Biles, of Frankfort, that on the shipment of live stock. Both discussions were of special interest to the practitioners. Dr. T. P. Polk, of Lexington, presented an excellent paper on "Agricultural Extension Work and the Veterinarian."

The afternoon program was featured by two papers and the business session. Dr. R. H. Bardwell, of Lexington, spoke on "Farm Breeding Problems," and Dr. D. L. Proctor, of Lexington, gave an interesting paper on "Pneumonia."

Speakers on the second-day program were: Drs. G. W. Pedigo, of Glasgow; A. L. Queener; C. A. Miller, of Louisville; Frank Hare, of Lexington; C. L. Dunn, of Carrollton; B. F. Pigg, of London, and A. R. Theobald, of Cincinnati, Ohio. The latter gave a paper on, "Skin Diseases of Dogs," which was enjoyed by all.

The afternoon session was devoted entirely to a small-animal clinic held in the hotel. Dr. A. J. Steiner, of Lexington, was in charge. Various operations were performed, the most important of which were ear-trim, removal of the spleen, and medication of the cecum for whip-worms by means of laparotomy. Many demonstrations were given, such as examination for soundness, passage of the stomach-tube, ear-set, intravenous medication and bone-setting.

Officers elected for the coming year are: President, Dr. George W. Pedigo, Glasgow; first vice-president, Dr. F. E. Hull, Lexington; second vice-president, Dr. R. H. Bardwell, Lexington; secretary-treasurer, Dr. E. A. Caslick, Paris. Three new members were admitted: Drs. John Baird, of Lexington, E. M. Lang, Jr., and H. A. Calldemeier, of Louisville.

E. A. CASLICK, *Secretary.*

CENTRAL KENTUCKY VETERINARY MEDICAL ASSOCIATION

The Central Kentucky Veterinary Medical Association was organized July 13, 1934, when a group of 19 veterinarians from Lexington and Central Kentucky met at the Lafayette Hotel, in Lexington, for that purpose. It was announced that the Association was formed for social purposes only, and that meetings will be held every two months. It was announced also that ladies' nights will be held at various meetings.

Officers elected were: President, Dr. John Hagyard; executive vice-president, Dr. W. E. Coover; secretary-treasurer, Dr. A. J. Steiner, all of Lexington.

MISSOURI VETERINARY MEDICAL ASSOCIATION

The forty-third annual meeting of the Missouri Veterinary Medical Association was held at Jefferson City, July 17-19, 1934. In spite of the unprecedented heat and drouth, approximately 190 members and visitors attended the meeting. The sessions were held in the Assembly Hall of the House of Representatives in the Missouri Capitol, and those in attendance displayed their genuine interest in the program and in the activities of the Association by staying through the sessions, in spite of the extreme heat, which reached 110 degrees on the second day.

In a cordial address, Lieutenant Governor Frank Harris welcomed the veterinarians to Jefferson City, and an equally hearty response was made by Dr. J. S. Koen, of Saint Louis. An excellent literary program was presented. Dr. George E. Bartholomees, of Sheldon, read a paper on "Equine Influenza and Its Complications," which provoked a spirited discussion. Dr. S. W. Haigler, of Saint Louis, spoke on "Fright Disease of the Dog," which was greatly enjoyed. Dr. Donald D. Baker, of Wabash, Ind., discussed "Swine Diseases," and Dr. D. M. Campbell, of Chicago, talked on many matters of interest to veterinarians, stressing particularly the importance of the Twelfth International Veterinary Congress.

Hon. John T. Fitzsimmons, of the Missouri Supreme Court, gave an instructive address on "Law Enforcement." He was followed by Dr. H. D. Bergman, of Iowa State College, who discussed "Therapeutics as Applied to the Blood," and by Dr. E. A. Benbrook, also of Iowa State College, who presented the subject, "Internal Parasites of Cattle." Dr. Ralph Graham, of Jefferson City, talked on the activities of the U. S. Bureau of Animal Industry in Missouri. He was followed by Dr. H. E. Curry, State Veterinarian, who discussed veterinary matters in Missouri, with particular reference to drouth relief, tuberculosis eradication and the control of Bang's disease. Dr. A. J. Durant, of Columbia, brought the literary program to a close with an interesting talk on "Poultry Disease Control."

Throughout the entire two-day program, Dr. H. L. Bussong, of Belton, president of the Association, gave a good demonstration of how a presiding officer should conduct a meeting. The program was run on schedule, and each discussion was limited to the subject announced. Those in attendance were unanimous in declaring the meeting to be outstanding in all respects.

The ladies were entertained by Mrs. Guy B. Park at tea in the Governor's Mansion, and later were guests at a card party given

by the Jefferson City Chamber of Commerce. The most unusual feature of the entertainment for the veterinarians and their families was a dinner arranged at Missouri's Intermediate Reformatory, at Algoa Farms. This is the only institution of its kind in the United States, and is that part of the Missouri Prison System where first offenders between the ages of 17 and 25 are given an opportunity to "come back."

Officers elected for the coming year are: President, Dr. George E. Bartholomees, Sheldon; vice-president, Dr. S. W. Haigler, Saint Louis; secretary-treasurer, Dr. Ashe Lockhart, Kansas City (reëlected).

ASHE LOCKHART, *Secretary.*

VETERINARY ASSOCIATION OF SASKATCHEWAN

The twenty-sixth annual meeting of the Veterinary Association of Saskatchewan was held in the Arts Building, University of Saskatchewan, Saskatoon, July 27, 1934, with more than half the membership in attendance.

The literary program opened with a discussion of "Part-time Tuberculosis Testing with the Health of Animals Branch, Department of Agriculture, Ottawa, Ontario," led by Dr. J. L. Millar. The men who had passed Civil Service examinations for this work took part in the discussion, which held much of interest for them as well as for prospective candidates for the examinations.

Meat and milk inspection for rural communities was discussed. It was pointed out that there is no control whatever of the meat and milk sold in the Province, except in the large cities. It was emphasized that this is a serious state of affairs from a public health standpoint, especially in relation to the diseases of animals communicable to man through meat and milk.

Undulant fever is one of the serious diseases coming from animals, according to Dr. J. S. Fulton, Animal Pathologist at the University, who pointed out that more than 50 cases had been diagnosed in blood samples sent to his laboratory from various parts of the Province. He reported that he had taken the matter up with the Minister of Public Health, and the Minister had promised to do what he could to try to control the diseases of animals communicable to man, through an improved health service. "The only man suitable to do this work is the veterinary surgeon who is posted in this aspect of his profession," Dr. Fulton emphasized.

Officers elected for the coming year are: President, Dr. J. L. Millar, Asquith; vice-president, Dr. D. W. MacDonald, Moosejaw; registrar, Dr. Norman Wright, Saskatoon. Named on the Council are: Drs. J. L. Millar, D. W. MacDonald and Norman Wright; J. S. Fulton, Saskatoon; M. Barker, Regina; H. Richards, Indian Head; and A. Chambers, Weyburn. The Executive Committee consists of Drs. J. L. Millar, J. S. Fulton and Norman Wright.

NORMAN WRIGHT, *Registrar.*

SOUTHEASTERN WISCONSIN VETERINARY ASSOCIATION

The midsummer clinic of the Southeastern Wisconsin Veterinary Association was held at the hospital of Dr. E. L. Morgenroth, of Kewaskum, August 25, 1934, with 50 members in attendance. The clinic was in charge of Drs. Morgenroth, A. J. Kletti, of Slinger, and Edward Boesewetter, of West Bend.

Surgical operations were performed as follows: The removal of cystic calculus in a gelding, by Drs. Boesewetter and Kletti; roaring operation, by Drs. Charles F. Van de Sand, of Kiel, and W. L. Horn, of Valders; ovariotomy in a large collie, and the setting of the ears of a Boston bull, by Dr. Albert W. Lange, of Watertown. Demonstrations included pullorum-disease bleeding and testing, by Dr. A. F. Pynn, of Oconomowoc; caponizing, by Dr. Walter Wisnicky, of Madison; judging Beagle hounds, and comparing the American and English types, by Dr. Morgenroth.

J. O. MCCOY, *Secretary.*

Doctor Evans Retired

Dr. W. A. Evans, honorary member of the A. V. M. A., has retired as health editor of the *Chicago Tribune*, Chicago, Ill., and has taken up his residence at Muldon, Monroe County, Miss. Dr. Evans long has been a notable figure in the medical world. For a number of years, he served as Health Commissioner of Chicago, and his articles on "How to Keep Well" in the *Chicago Tribune* were widely read. He is also a prominent Rotarian, having served the Chicago Club in many official capacities. A. V. M. A. members who attended the meeting in Chicago last summer will recall Dr. Evans as one of the banquet speakers.

Good company and good discourse are the very sinews of virtue.

Isaak Walton.

NECROLOGY

ALBERT BECK

Dr. Albert Beck, of Elsinore, Calif., died March 12, 1934, following a long illness with arthritis. He had been confined to his bed two years prior to his death.

Born June 23, 1871, near Traer, Iowa, Dr. Beck moved with his parents to a farm near Glidden, Iowa, when he was eleven years old. Six years later, he went to Colorado where he worked on a stock ranch until 1894 when he returned to Auburn, Iowa, where he conducted a livery business. Later he decided to become a veterinarian and entered the Kansas City Veterinary College. Later he transferred to the Grand Rapids Veterinary College and received his degree from the latter institution in 1902. He continued his studies at the Chicago Veterinary College, and was graduated in 1904. The following year, he entered private practice at Auburn, where he practiced until ill health forced him to retire. He went to California in 1926 and had lived there since. Surviving Dr. Beck is his widow (née Edna L. Crandall).

E. C. B.

JOHN H. BURKHARDT

Dr. J. H. Burkhardt, of Stemmers Run, Md., died November 23, 1933, his death being caused by a combination of diabetes and cranial carbuncles. He was 65 years of age. Dr. Burkhardt spent his boyhood in Baltimore, Md., and studied veterinary medicine at the United States College of Veterinary Surgeons, Washington, D. C., receiving his degree in 1910. Surviving are his widow, one son and one brother.

M. W.

O. P. DAVIS

Dr. O. P. Davis, of Lewistown, Mont., died July 13, 1934, as the result of a thrombus in the coronary artery.

Born in Nevada, Mo., July 13, 1887, Dr. Davis attended local schools and then entered the Kansas City Veterinary College. Fol-

lowing his graduation in 1915, he returned to Nevada, where he practiced until April, 1917, when he entered the U. S. Army as a second lieutenant in the Veterinary Corps. He was promoted to a captaincy on November 12, 1917, and assigned to the 35th Veterinary Division. He was breveted a major on October 6, 1918, and on April 15, 1919, he was assigned as assistant chief veterinarian of the Third Army. On July 28, 1919, he returned to private life, going directly to Lewistown, Mont., where he became associated with Dr. H. F. Wilkins. This association continued until December, 1930, when Dr. Wilkins moved to Helena, Mont. Dr. Davis continued the practice, and served also as resident deputy state veterinary surgeon with the Montana Live Stock Sanitary Board.

Dr. Davis had been carrying on some interesting researches in connection with the control of Bang's disease by a spaying program and, inasmuch as the work had not been completed and the data compiled, it is likely that many months may go by before the information which he collected is correlated. Dr. Davis was a capable and conscientious veterinarian, and his untimely passing has made a decided vacancy in the veterinary ranks of Montana.

H. F. W.

ARCHIE M. EHLE

Dr. Archie M. Ehle, of Kansas City, Mo., died July 23, 1934. Death was caused by pericarditis aggravated by a heat stroke.

Born in Independence, Mo., August 4, 1892, Dr. Ehle was a graduate of the Chicago Veterinary College, class of 1917. Following his graduation, he practiced at Oak Grove, Mo., until he entered military service a few months later. He was commissioned a second lieutenant, December 5, 1917, and was ordered to active duty, August 7, 1918, being assigned to the 310th Auxiliary Remount Department, Camp Sevier, S. C. Upon receiving his discharge, December 3, 1918, Dr. Ehle returned to Oak Grove and practiced there until 1926. In that year, he came to Chicago to become associated with Dr. E. L. Quitman and remained four years. In 1931, he returned to Kansas City, Mo., but, because of the state of his health, had not been able to engage in active veterinary practice.

Dr. Ehle joined the A. V. M. A. in 1921. He was a member of the Missouri Veterinary Medical Association and of the Kansas City Veterinary Association. He was also a member of the Gamma Chapter of Alpha Psi Fraternity.

F. M. BUTLER

Dr. F. M. Butler, of Warsaw, Ohio, died on July 27, 1934, from pneumonia. He had been seriously ill for several days.

Born in Warsaw, March 6, 1889, Dr. Butler was graduated from the Warsaw High School. He entered Ohio State University, and received his degree in veterinary medicine in 1910. Returning to Warsaw, Dr. Butler entered practice and served that community and neighboring towns until his death, with the exception of a period spent overseas during the World War as a first lieutenant in the Veterinary Corps, serving with the 84th Division. He is survived by a sister.

JOHN S. RENO

Dr. John S. Reno, of Southport, Ind., was crushed to death August 1, 1934, when a tree he was helping to fell on his farm snapped and pinned him to the ground.

Born in Franklin Township, Marion County, Ind., January 18, 1885, Dr. Reno was educated in the Perry Township schools and the Indiana Veterinary College, receiving his degree from the latter institution in 1910. For the past 19 years, Dr. Reno had been in the service of the U. S. Bureau of Animal Industry.

Dr. Reno jointed the A. V. M. A. in 1912. He was a past master of the Masonic Lodge at Southport. Surviving are his widow (née Eva Frazee), one son, one daughter, three sisters and one brother.

HARVE FRANK

Dr. Harve Frank, of Jewell, Kan., died at the Security Benefit Hospital, Topeka, Kan., August 2, 1934, following an illness of about two weeks. Dr. Frank seemingly was recovering rapidly from an operation for appendicitis when death occurred, the result of coronary embolism.

Born on a farm near Randall, Kan., October 22, 1892, Dr. Frank lived there until he was twelve years old, when his family moved to Jewell. He was graduated from the Jewell High School, in 1913, and entered the Division of Veterinary Medicine, Kansas State College, receiving his degree in 1917. In April, 1917, he enlisted in the United States Army, at Fort Riley, Kan. He was commissioned a lieutenant in the Medical Corps, June 20, 1917, but was not inducted into the service until November 8, 1917. At

the conclusion of the War, he returned to Jewell to take up the practice of his profession, which he carried on with great proficiency until his untimely death.

Dr. Frank joined the A. V. M. A. in 1917. He organized an American Legion Post in Jewell, serving as its first adjutant, and later as commander. For many years, he served as treasurer of the Jewell Elementary School Board and as a trustee of the Benjamin Musser Educational Fund. He served two terms as mayor of Jewell, and at the time of his death was a member of the City Council. He had been master of Jewell Lodge No. 11, A. F. & A. M., and high priest of the Royal Arch Masons Chapter No. 85. He was active in the work of the Chamber of Commerce and had served as president and member of the executive committee. Surviving Dr. Frank are his widow (née Irma Fox), one daughter, six brothers and two sisters.

JAMES W. HARWOOD

Dr. J. W. Harwood, of Bloomington, Ill., died at Brokaw Hospital, August 6, 1934, a victim of cancer of the liver.

Born in Paterson, N. J., September 6, 1863, Dr. Harwood was graduated from the American Veterinary College in 1887. Following his graduation, he settled in Bloomington and for a time was associated in practice there with Dr. W. L. Williams, before the latter joined the faculty of the New York State Veterinary College, at Cornell University. Later, Dr. Harwood took over the practice and maintained it until his death. Surviving him are his widow, three brothers and one sister.

EDWARD H. LIEBENSTEIN

Dr. Edward H. Liebenstein, of Grafton, Wis., died suddenly, August 22, 1934, as the result of a heart attack. He had returned from a professional call and had parked his car in front of a physician's office when the attack came.

Born near Batavia, Wis., August 5, 1895, Dr. Liebenstein was graduated from the Grand Rapids Veterinary College in 1917. He practiced at Cascade, Wis., until 1923, when he removed to Grafton, where he had practiced since. Surviving Dr. Liebenstein are his widow (née Mabel Lammers), four sons, his mother, three sisters and two brothers.

HENRY F. ECKERT

Dr. H. F. Eckert, of Markesan, Wis., died at the Saint Agnes Hospital, Fond du Lac, Wis., August 7, 1934.

Born at Lowell, Wis., December 3, 1869, Dr. Eckert attended local schools and the Chicago Veterinary College. Following his graduation, in 1890, he located in Markesan, where he practiced until a few months prior to his death. He was a worthy citizen, and always maintained a high standard of professional conduct. His funeral was attended by a large assembly of friends, relatives and neighboring veterinarians. Burial was made in the Markesan Cemetery.

Dr. Eckert joined the A. V. M. A. in 1909. He is survived by his widow (née Augusta Schwach), one son and one daughter.

A. S. E.

WILLIAM M. SPRENGLE

Dr. William M. Sprengle, of Cleveland, Ohio, died suddenly, August 18, 1934, following a heart attack. He was 73 years old.

Born at Ashland, Ohio, Dr. Sprengle was graduated from the Chicago Veterinary College with the class of 1888. Previously he had spent a term at the Ontario Veterinary College. For several years, he was in charge of the South Elkhorn Stock Farm, at Frankfort, Ky., leaving there in the early '90s to serve as veterinarian to well-known stables in Cleveland, including that of C. K. G. Billings. Two years ago, Dr. Sprengle was appointed official veterinarian for the Thistle Down and North Randall race tracks, but up to that time he had confined his efforts to harness horses. He is survived by one son.

PERSONALS

MARRIAGE

Dr. Herbert J. Eichhorn (O. S. U. '30), of Cardington, Ohio, to Miss Elpha Mauller, of LaRue, Ohio, at LaRue, August 11, 1934.

BIRTHS

To Dr. and Mrs. R. H. Tesdell, of Ogden, Iowa, twin sons, Roger Leon and Ralph Leroy, April 6, 1934. Ralph Leroy lived but five hours, but Roger Leon is thriving.

To Dr. and Mrs. John D. Beck, of Philadelphia, Pa., a daughter, Gene Alice, May 28, 1934.

To Dr. and Mrs. M. F. Frevert, of West Union, Iowa, a daughter, June Elizabeth, August 12, 1934.

PERSONALS

DR. F. W. CHANDLER (K. C. V. C. '10), of Bowen, Ill., has removed to Golden, same state.

DR. B. E. KNISELY (O. S. U. '34), has opened a small-animal hospital at Worthington, Ohio.

DR. R. M. SMITH (O. S. U. '34), of Bowersville, Ohio, has located for practice at Jamestown, Ohio.

DR. W. N. COCHRAN (T. H. '12) has re-entered practice at Flat Rock, Ill., after an interval of several years.

DR. SAM ELMER (O. S. U. '34) has opened an office at Richland Center, Wis., where he will engage in general practice.

DR. MAURICE J. COURT (Mich. '34), of Lowell, Mich., has decided to enter practice at Lowell, and has opened an office there.

DR. C. MAX RODGERS (O. S. U. '34), of Monmouth, Ill., has located in Avon, Ill., where he will assist Dr. W. Lester Hollister.

DR. W. C. KORTENBER (Gr. Rap. '10), of New Haven, Ind., underwent an operation recently for the removal of a ruptured appendix.

DR. L. A. GRAY (O. S. U. '32), of Bushnell, Ill., gave an interesting talk before the Bushnell Rotary Club, at the regular meeting on August 13.

DR. H. G. HOYT (Iowa '34), of Maple Park, Ill., has located at Dundee, Ill., where he has opened a hospital and succeeded to the practice of the late Dr. Fred Scidmore.

DR. ELMER L. ROOKS (O. S. U. '32), of Greenfield, Ohio, underwent an emergency operation for the removal of his appendix, at Mount Carmel Hospital, Columbus, Ohio, August 13.

DR. J. ALLYN ROGERS (U. P. '26), of Bryn Mawr, Pa., is convalescing at the Graduate Hospital at the University of Pennsylvania, from an abdominal operation which he underwent in June.

DR. C. N. BRAMER (Corn. '23), of Evanston, Ill., was the featured speaker at the Evanston Kiwanis Club weekly luncheon recently. His discourse dealt with the observations made during his years of working with pets.

DR. JOHN D. BECK (U. P. '28), assistant professor of veterinary medicine at the University of Pennsylvania, has been granted leave of absence for a year in order to study abroad. He is expected to sail for Edinburgh about September 1.

DR. GEORGE W. JENSEN (Chi. '18), of Antioch, Ill., who was badly injured in an automobile accident two years ago and who brought suit against Earl McCarthy, driver of the car that crashed into his, has dismissed the suit, following a satisfactory settlement.

DR. EMMETT T. DAVIS (Ind. '10), of Indianapolis, Ind., was kidnaped by two bandits with revolvers and robbed of $5 and his automobile early July 9. He was forced to drive the bandits to Twenty-fifth and Bellefontaine Streets, where he was robbed and ordered from his car.

DR. W. W. DIMOCK (Corn. '05), of the Department of Animal Pathology, University of Kentucky, has been granted a leave of absence of several months to accept the invitation of the British Bloodstock Agency to visit England and France and give technical advice and lectures.

DR. L. R. BARTO (U. P. '30), of Summit, N. J., will sail on September 12 for a year of study in Europe. He plans to spend two semesters in Berlin, and then make an observation tour of all the leading clinics in Germany, England, France, Italy and Switzerland. Dr. Barto will specialize in clinical medicine and surgery.